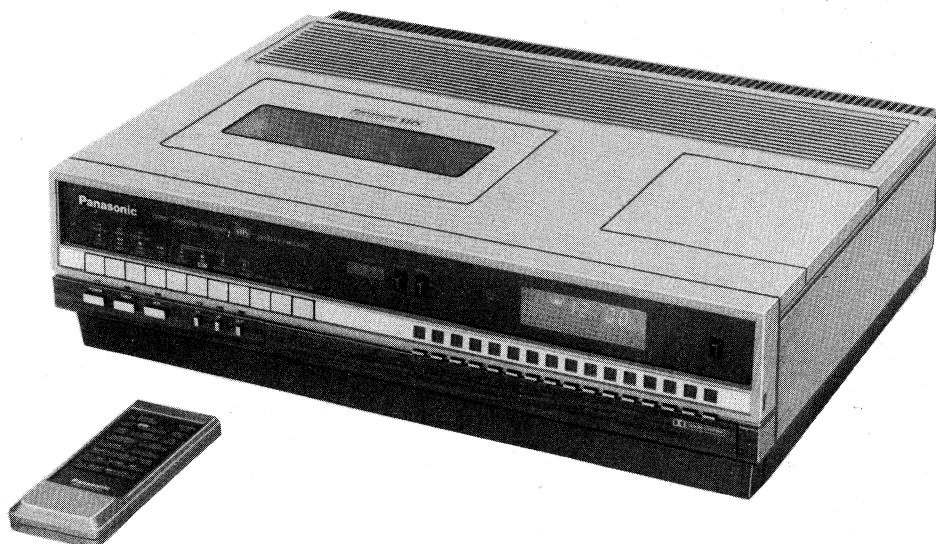


Service Manual

Video Cassette Recorder

Panasonic
 Omnivision **VHS**
PV-1780

Vol. 1

*Summary
Technical
Descriptions*

Vol. 2

*Mechanical
Adjustment
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Replacement
Parts List*

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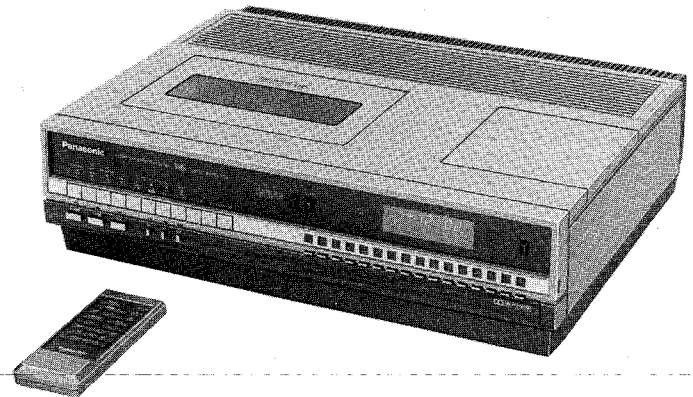
Service Manual

Video Cassette Recorder

Panasonic **VHS**
Omnicision
PV-1780

Vol. 1

Summary Technical Descriptions



SPECIFICATIONS

Power Source: 120 V AC $\pm 10\%$, 60 Hz $\pm 0.5\%$
 Power Consumption: Approx. 47 watts
 Television System: EIA Standard (525 lines, 60 fields)
 NTSC color signal

Video Recording

System: 4 rotary heads helical scanning system
 Luminance: FM azimuth recording
 Chrominance: Converted subcarrier phase shift recording

Audio Track: 2 track
 Tape Format: Tape width 1/2" (12.7 mm), high density tape
 Tape Speed: SP mode: 1-5/16 i.p.s (33.35 mm/s)
 LP mode: 2 1/32 i.p.s (16.67 mm/s)
 SLP mode: 7/16 i.p.s (11.12 mm/s)
 Record/Playback Time: 360 min. with NV-120 used in SLP mode
 FF/REW Time: Less than 6 min with NV-T120
 Heads: Video: 4 rotary heads
 Audio: 2 stationary heads/
 Control: 1 stationary head
 Erase: 1 full track erase
 1 audio track erase for audio dubbing

Input Level: Video: Video IN Jack (RCA type)
 1.0 Vp-p, 75 Ω unbalanced
 Audio: MIC IN Jack (Right, left)
 -70 dB, 4 k Ω unbalanced
 Audio IN Jack (RCA type)
 -20 dB, 100 k Ω unbalanced

TV Tuners: VHF Input: Ch2-Ch3,
 cable channels "A"—"W"
 75 Ω unbalanced
 UHF Input: UHF Ch14-Ch83,
 300 Ω balanced

Output Level: Video: Video OUT Jack (RCA type)
 1.0 Vp-p, 75 Ω unbalanced
 Audio: Audio OUT Jack (RCA type)
 (Right, left)
 -9 dB, 600 Ω unbalanced

RF Modulated: Channel 3 or 4
 72 dB μ , (Open voltage)
 75 Ω unbalanced

Video Horizontal

Resolution: Color: more than 230 lines
 B/W: more than 270 lines

Audio Frequency

Response: SP mode: 100 Hz ~ 8 kHz
 LP mode: 100 Hz ~ 6 kHz
 SLP mode: 150 Hz ~ 5 kHz (10 dB down)

Signal-to-Noise Ratio: Video: better than 40 dB
 (Rohde & Schwarz noise meter)
 Audio: SP mode: better than 42 dB
 LP mode: better than 40 dB
 SLP mode: better than 40 dB
 (Dolby NR ON)

Operation

Temperature: 41°F—104°F (5°C—40°C)

Operating Humidity: 10%—75%

Weight: 25.3 lbs (11.5 kg)

Dimensions: 18-7/8" (W) \times 14-1/4" (D) \times 5-3/8" (H)
 (480 mm \times 356 mm \times 136 mm)

Accessories Supplied:

- Blank tape
- Wireless remote control unit
- 75 Ω —300 Ω matching transformer
- 300 Ω —75 Ω matching transformer
- Coaxial cable (5 ft) with F type connectors
- Twin lead wire (5 ft)
- Dust cover
- Vertical-Lock tool

Available Tapes:

1/2" VHS video cassette tapes
 NV-T120 Approx. 810 ft. (247 m),
 2, 4 or 6 hrs.
 NV-T60 Approx. 417 ft. (127 m),
 1, 2 or 3 hrs.

Weight and dimensions shown are approximate. Specifications are subject to change without notice.

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INTRODUCTION

This Training Manual contains general technical information and detailed circuit explanations which will allow service technicians to understand the VHS Video Cassette Recorder Model PV-1780.

The PV-1780 has 2, 4, and 6 hour recording and playback speeds, timer recordings of up to 8 programs during two weeks, a new 4-head video system which reduces interference during multi-motion playback, a simplified and reliant tape loading method, a directly driven head cylinder and capstan motor and a rugged and reliable aluminum die-cast chassis.

*Other features of the PV-1780 include a new 2-channel audio system which allows recording and playback in stereo, a new *Dolby Noise Reduction system, One-Touch Recording for impromptu timer recordings, and servo controlled multi-motion playback modes. These motions, include two speed search forward and reverse (SP, LP, and SLP) field—still and variable field—slow (SP, SLP), frame advance (SP, SLP) and double speed playback (SP, SLP).*

In addition to these features, the PV-1780 offers a wireless remote control unit for full function remote operation that includes channel changing. When used in cable systems, the extended range push buttons tuner allows reception of standard mid-band (channels A-I) and super-band (channels J-W) TV programs.

The PV-1780 also features a fine editing function and soft touch push buttons through the use of microprocessor technology.

These features in addition to the basic VHS format make the PV-1780 an ideal unit for your education, recreation, and entertainment.

Just slightly ahead of our time.....Panasonic.

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*Noise reduction system manufactured under license from Dolby Laboratories.

*'Dolby' and the double-D symbol are trademarks of Dolby Laboratories.

FEATURES

1. Six hour recording

New system for high-density recording allows up to 6 hours of recording on a single NV-T120 tape.

2. Field-still, Field-slow

The unit makes the Still, Slow playback picture to be viewed more vivid without indicating motion or blurred action.

3. Multi-motion playback

In addition to playback at normal speed, Field-still and Field-slow, you can operate multi-motion playback as follows.

2 SPEED SEARCH*	forward and reverse at 5 times and 15 times normal speed (LP, SLP) or 5 times and 9 times normal speed (SP)
FIELD-STILL	to view a single scene (tapes recorded at SP, SLP mode)
VARIABLE* FIELD-SLOW	at 1/4~1/30 normal speed (tapes recorded at SP, SLP mode)
FRAME ADVANCE	to advance a field-still picture (tapes recorded at SP, SLP mode)
DOUBLE SPEED* PLAYBACK	playback at 2 times normal speed (tapes recorded at SP, SLP mode)

*Variable slow motion, double speed, and fast search can only be actuated by the wireless remote control.

4. Fine-editing function

The unit eliminates the editing problem common to ordinary VCRs. When the pause is used during recording, the tape will automatically rewind slightly to reduce this break to a minimum of interference.

5. Watch one channel while recording another

The built-in tuner allows the recording of a program that you don't want to miss while watching another program.

6. Unattended recording

The built-in programmable tuner/timer permits you to record up to 8 programs within a period of 14 days.

7. One touch recording

The unit enables you to do impromptu timer recordings at any time. Just select the channel and push the One Touch Record Button for 30 minutes to 2 hours of recording.

8. Audio two channel

New Audio two channel system allows recording and playback in stereo.

9. Dolby noise reduction

The unit includes a Dolby noise reduction circuit.

10. Wireless remote control









The 16 function Wireless Remote Control provides: POWER, RECORD, PLAY, REWIND, FAST-FORWARD, STOP, PAUSE/STILL, CHANNEL, VCR/TV, FRAME ADVANCE, DOUBLE SPEED, SLOW-SPEED <Up, Down>, SEARCH <Forward, Reverse>, FAST SEARCH <Forward, Reverse>.

11. Cable-ready

When used in cable systems, the extended range tuner allows reception of standard Mid-Band (Channels A-I) and Super-Band (Channels J-W) TV programs. However, reception of intentionally scrambled programs may require special equipment from your cable company.

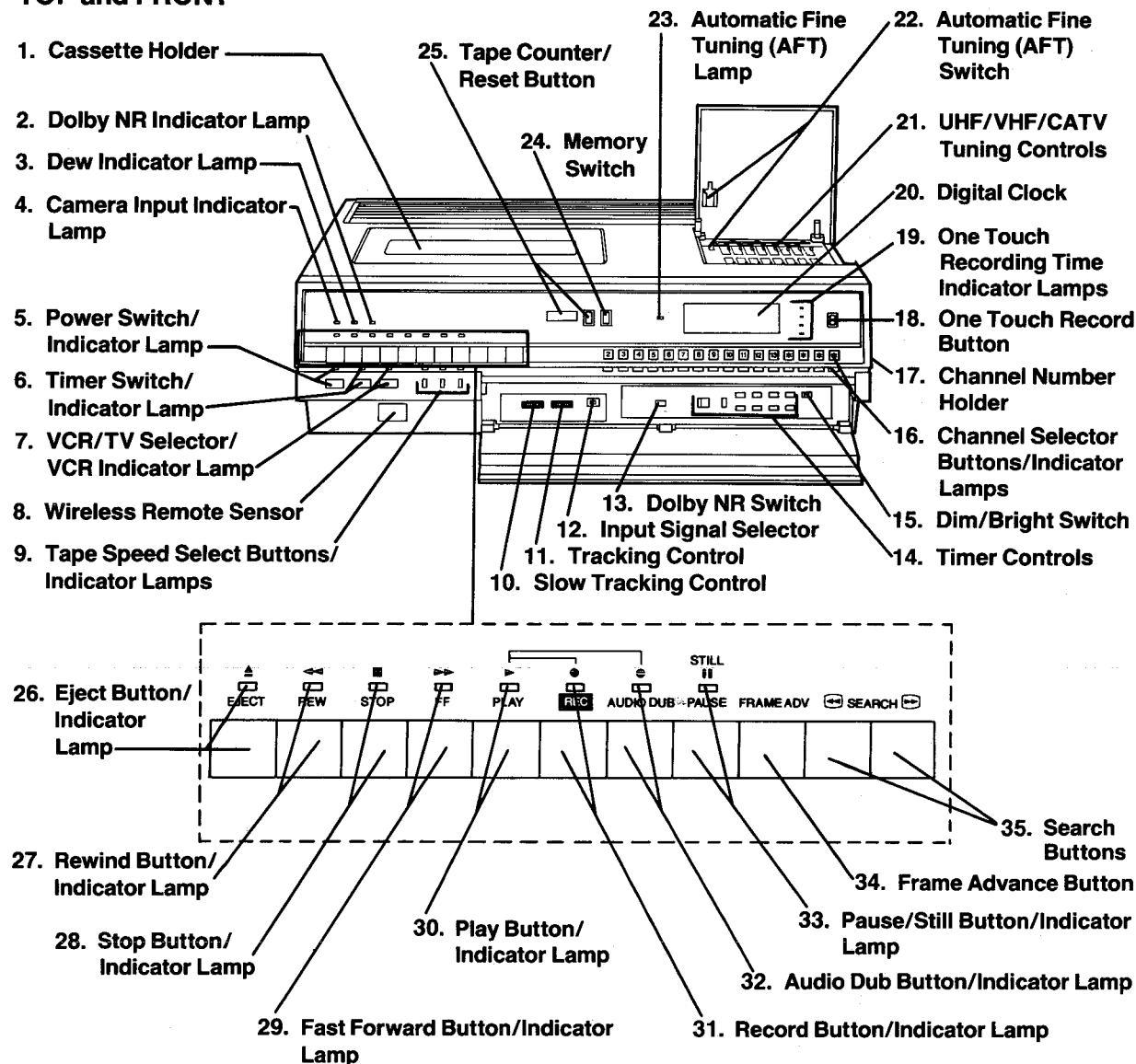
ACCESSORIES SUPPLIED

After removing the unit from its box, check to be sure it has not sustained any damage. Also check to see that you have the following accessories as pictured below.

1 pc. Video cassette tape NV-T60 	1 pc. VHF matching box 75 ohm-300 ohm transformer, VSQ0055 	1 pc. 300 ohm-75 ohm transformer, VSQ0057 	1 pc. Coaxial cable with one-touch type F connector, VJA0147 
1 pc. Twin-lead cable, VJA0102 	1 pc. Dust Cover, VYCS0060 	1 pc. Wireless remote control, VSQS0138 	1 pc. Vertical-Lock tool, VFKS0014 

CONTROLS AND COMPONENTS

TOP and FRONT



1. Cassette Holder

2. Dolby NR Indicator Lamp

The green lamp lights up when the Dolby NR Switch is ON.

3. Dew Indicator Lamp

If condensation occurs in the VCR, the yellow lamp lights up and the unit will not operate.

4. Camera Input Indicator Lamp

The green lamp lights up when the Input Signal Selector is in CAMERA position.

5. Power Switch/Indicator Lamp

This switch is used to turn the VCR on and off.

6. Timer Switch/Indicator Lamp

This switch is used for unattended recording after programming functions have been completed. When this switch is ON, the Indicator Lamp will light and you will not be able to operate the unit manually.

7. VCR/TV Selector/VCR Indicator Lamp

VCR: Push this button once to monitor video recording or to view playback.

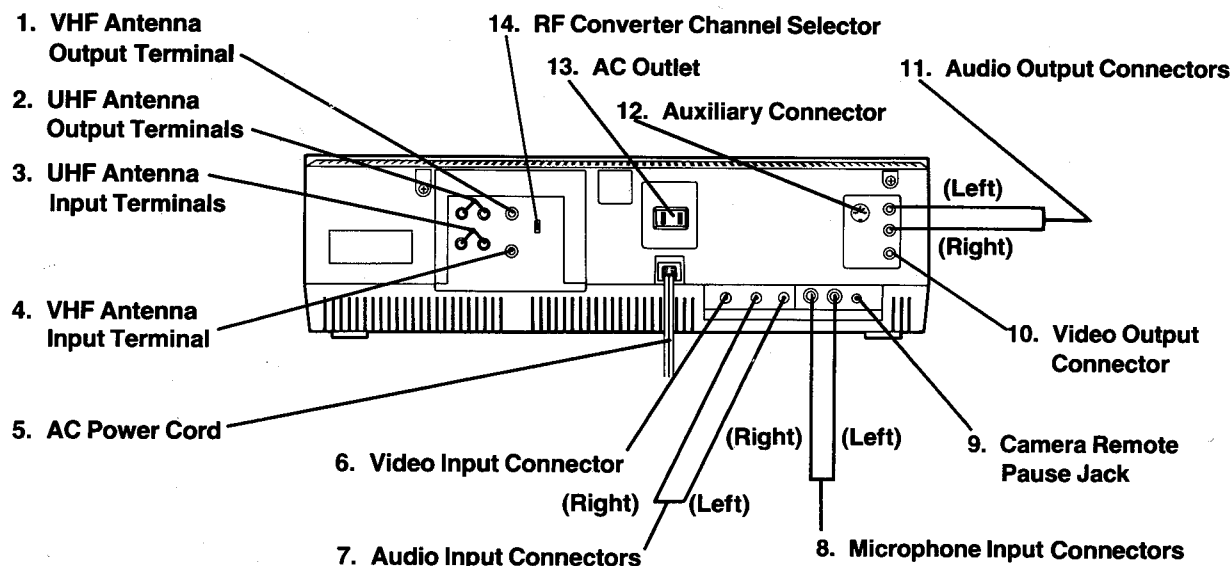
TV: Push this button again to watch TV, or view another program while recording a different program.

8. Wireless Remote Sensor

Receives the signal from the Wireless Remote Control.

- 9. Tape Speed Select Buttons/Indicator Lamps**
Push the desired speed button; SP, LP or SLP. The Red Indicator Lamps show tape speed during recording and playback.
- 10. Slow Tracking Control**
Use this control during slow-motion playback if the image is partially obscured by bands of noise.
- 11. Tracking Control**
Use this control during regular playback if the image is partially obscured by bands of noise.
- 12. Input Signal Selector**
CAMERA: For camera recording or audio dubbing.
AUDIO 2CH: For picture recording from TV and sound recording from radio broadcast at the same time or for audio dubbing.
TUNER: For regular TV recording.
- 13. Dolby NR Switch**
Set this switch to ON for audio noise reduction.
- 14. Timer Controls**
Used to set the timer for the present and to desired times for unattended recording.
- 15. Dim/Bright Switch**
For adjusting brightness of the Digital Clock display.
- 16. Channel Selector Buttons/Indicator Lamps**
Select the channels (2-83, A-W) you wish to view or record by pressing any one of these 16 buttons.
- 17. Channel Number Holder**
Pull it out for changing channel tabs.
- 18. One Touch Record (O.T.R.) Button**
One Touch Recording enables you to do impromptu recordings at any time. Just select the channel and push the One Touch Record Button for 30 minutes to 2 hours of recording.
- 19. One Touch Recording (O.T.R.) Time Indicator Lamps**
These lamps indicate O.T.R. times.
- 20. Digital Clock**
Displays the current time and the times at which unattended recording is to start and stop.
- 21. UHF/VHF/CATV Tuning Controls**
There are sixteen positions available (sixteen buttons) and each one can be tuned to any channel you desire.
- 22. Automatic Fine Tuning (AFT) Switch**
Under normal conditions turn the AFT switch ON. When the Tuning Control Panel door is opened the AFT circuit is defeated (AFT Lamp turns OFF). Turn the AFT ON and close the Tuning Control Panel door (AFT Lamp turns ON) to engage the AFT.
- 23. Automatic Fine Tuning (AFT) Lamp**
The Lamp lights up to indicate that the Automatic Fine Tuning is engaged.
- 24. Memory Switch**
When this switch is in the "ON" position, the tape will stop during rewind when the Tape Counter reaches "0000".
- 25. Tape Counter/Reset Button**
Push to reset the tape counter to "0000" before starting the recording or playback. The counter indicates how far the tape has moved. It is very useful for locating the beginning of programs.
- 26. Eject Button/Indicator Lamp**
Push this button to insert or to remove cassette.
- 27. Rewind Button/Indicator Lamp**
Push this button to rewind tapes.
- 28. Stop Button/Indicator Lamp**
Push this button to stop the tape.
- 29. Fast Forward Button/Indicator Lamp**
Push this button to move the tape forward rapidly.
- 30. Play Button/Indicator Lamp**
Push this button to play back recorded tapes.
- 31. Record Button/Indicator Lamp**
Recording is started by pushing this button and the Play Button at the same time.
- 32. Audio Dub Button/Indicator Lamp**
When this button and the Play Button are pushed simultaneously during playback, sound from another source can be recorded on the tape in place of the original sound. (The original sound will be erased.)
- 33. Pause/Still Button/Indicator Lamp**
Push this button to temporarily stop the tape movement in either the recording or playback mode. Push again to release pause.
- 34. Frame Advance Button**
Push this button to advance a field-still picture.
- 35. Search Buttons**
During playback, press these buttons to view the picture forward or back rapidly.

BACK



1. VHF Antenna Output Terminal (To TV Set)

Connect this terminal to the VHF antenna terminal on the TV.

2. UHF Antenna Output Terminals (To TV Set)

Connect these terminals to the UHF antenna terminals on the TV.

3. UHF Antenna Input Terminals (From Antenna)

Connect the UHF antenna to these terminals.

4. VHF Antenna Input Terminal (From Antenna or CABLE)

Connect the VHF antenna or CABLE to this terminal.

5. AC Power Cord

Connect to a 120 V 60 Hz AC outlet.

6. Video Input Connector

For connection from another VCR or a portable video camera.

7. Audio Input Connectors

For connection from the audio tuner for recording two channel broadcasts. Using this connection you can record video from the TV antenna and audio from your stereo units at the same time.

8. Microphone Input Connectors

For connection of microphone from each connector. Audio dubbing can be done on two channels.

9. Camera Remote Pause Jack

For connecting to an optional video camera's remote pause jack.

10. Video Output Connector

For connection to a monitor TV or another VCR.

11. Audio Output Connectors

For connection to your stereo units. With this connection you can play back two channel sound.

12. Auxiliary Connector

Connect the VCR Remote Control Cord of the CATV Adaptor/PV-CT2 (optional) to this Aux. connector. All functions (e.g. Program Recording, Recording one channel while watching another, etc.) will be operable for both regular TV channels and one pay TV channel. Refer to the Operating Instructions of PV-CT2.

13. AC Outlet

120 V AC convenience outlet for another appliance, such as television, etc., not for use with an appliance of more than 300 watts.

14. RF Converter Channel Selector

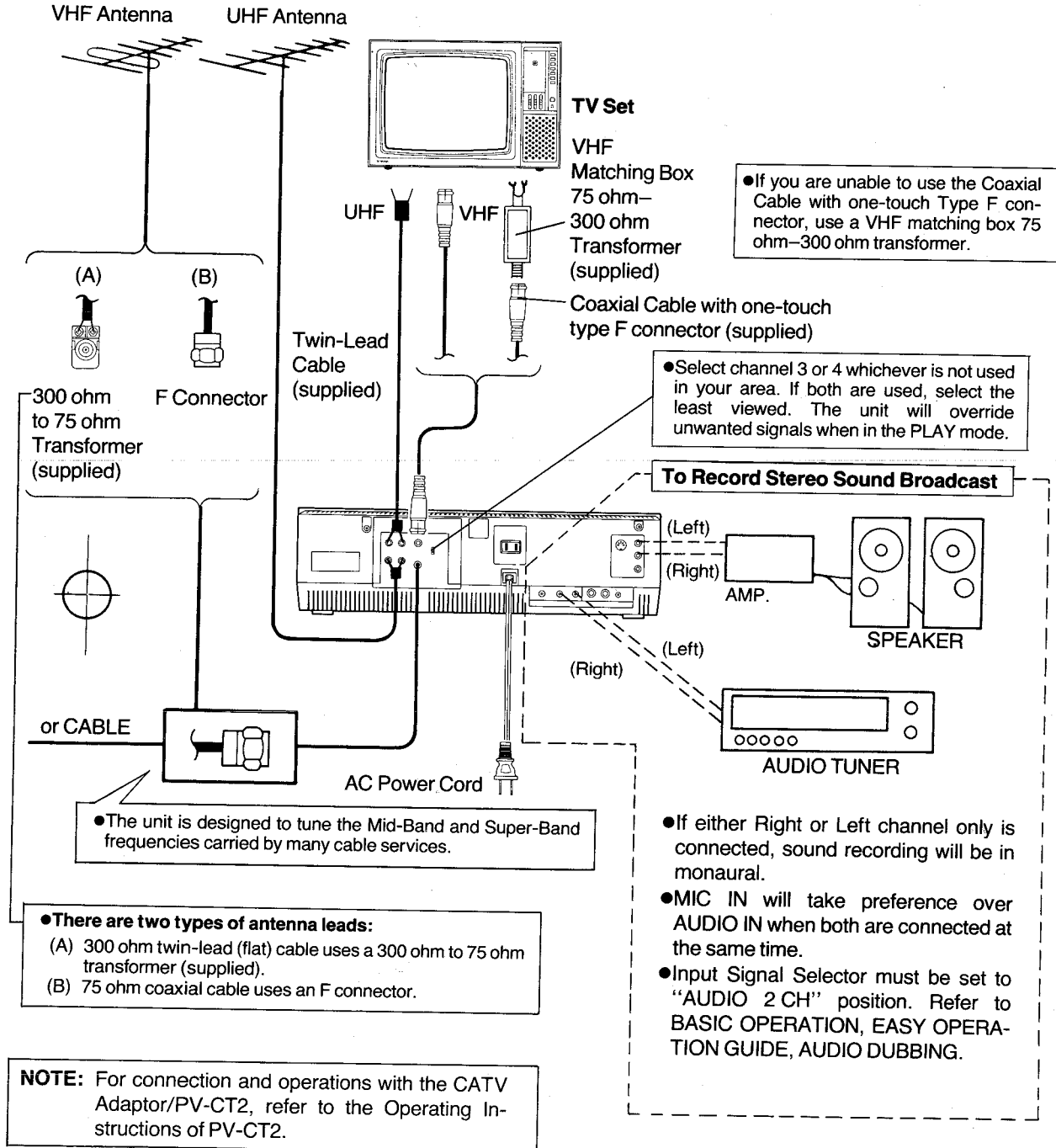
Set to channel 3 or 4, whichever is not used in your area.

CONNECTIONS

A. VHF/UHF Antenna/Cable-VCR-TV (for TV Recording/Playback)

Disconnect all TV antennas from your TV, reconnect them to the unit and TV as shown below.

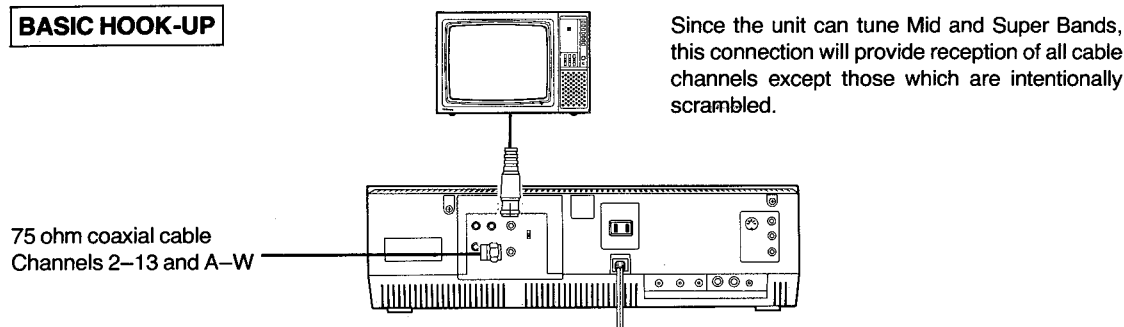
If you wish to record or play back a stereo sound broadcast using your stereo unit, add the connection enclosed by the dotted line below.



B. Cable-VCR-TV (for CATV/PAY Channels Recording/Playback)

The unit has an extended range, and can tune the Mid-Band and Super-Band cable channels. Also, the unit has 70 channel UHF tuning. Refer to FINE TUNING.

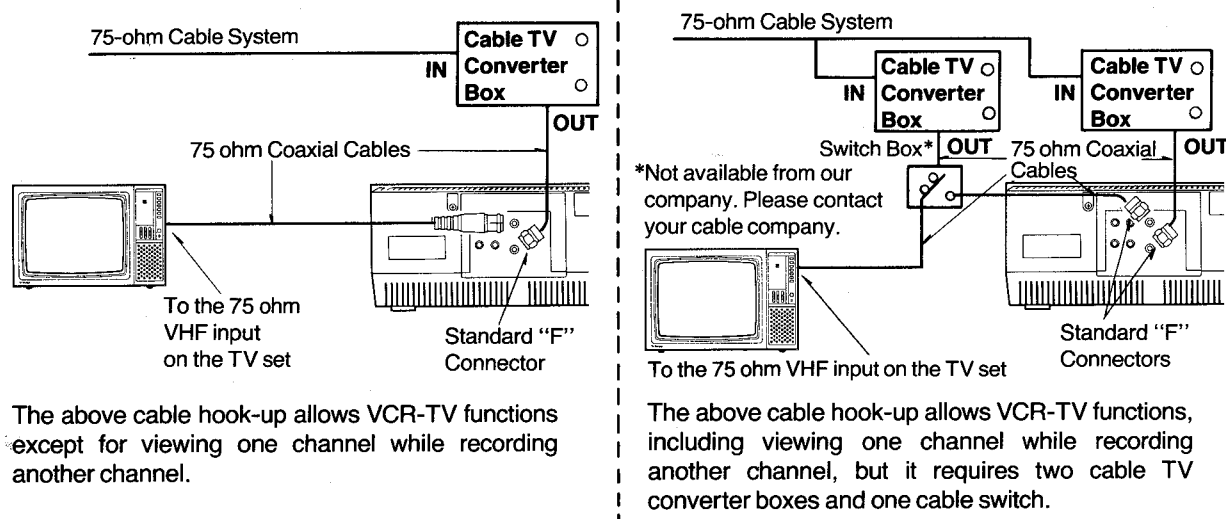
BASIC HOOK-UP



However, if you subscribe to a special channel which is scrambled—you probably have a descrambler box for proper reception. The PV-1780 by itself cannot properly receive a scrambled program since it does not contain a descrambler. In order for the PV-1780 to properly receive a scrambled program—your existing descrambler must be used.

There are two commonly used methods of connection in this case.

TYPICAL CABLE SYSTEM HOOK-UPS WITH CABLE CONVERTER/DESCRAMBLER BOXES



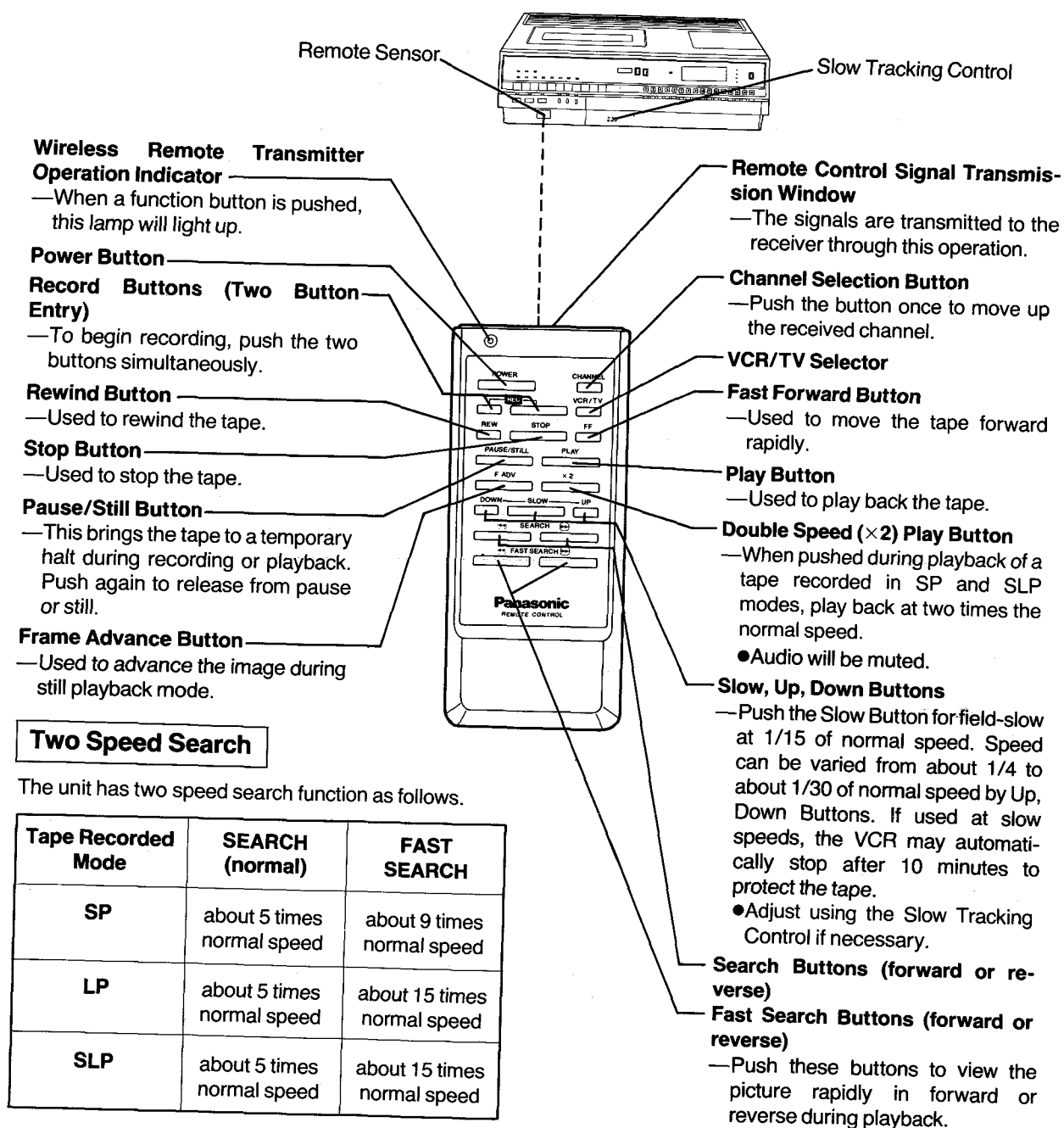
Since the PV-1780 has extended range tuning, tuning-programming of non-scrambled Mid-Band and Super-Band TV programs is possible, but when a cable converter or descrambler box is connected to the unit, all unattended recording functions will continue to operate with the exception of changing channels automatically. Channel selection will have to be performed with the cable converter. Unattended recording is therefore limited to one channel at any given time.

●Using the CATV Adaptor/PV-CT2 and the cable descrambler box.

All functions (e.g. timer recording, recording one channel while watching another) will be operable for both regular TV channels and one pay TV channel. Refer to the Operating Instructions of the PV-CT2.

WIRELESS REMOTE CONTROL

For convenient remote control of the PV-1780's functions (variable slow-motion, double speed, and search (normal) can only be activated by the wireless remote control).



A WORD ABOUT THE REMOTE CONTROL

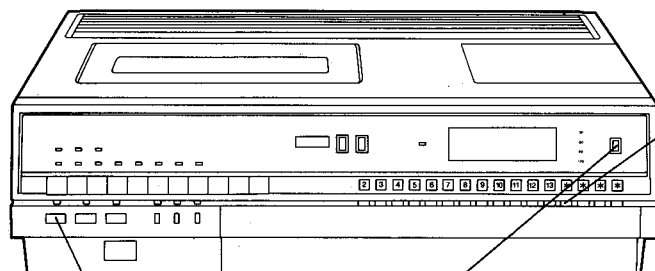
The PV-1780 utilizes an Infra-Red Wireless Remote Control System. This means that the remote commands are sent out as invisible light.

For best operation, aim the Wireless Remote Control directly at the receiver window (Remote Sensor) of the VCR. You may find that commands are received even if the Wireless Remote Control is aimed away from the VCR. This happens because the light will bounce off the walls of the room and eventually reach the remote sensor. Note that furniture can block the path, and dark walls may totally absorb the light. If the room receives a lot of sunshine, you may find that the commands are "masked" by the bright light. In this case, darken the room.

ONE TOUCH RECORDING

One Touch Recording (O.T.R.) enables you to do impromptu timer recordings at any time. When you have to go out for urgent matters or you are going to sleep, this function is very useful. Just select the channel and push the O.T.R. Button for 30 minutes to 2 hours of recordings. After recording, the VCR will be turned off automatically.

First Refer to **BASIC OPERATION and EASY OPERATION GUIDE** (same as "To watch and record the same program" or "To watch one while recording another".)



① Select CHANNEL to be recorded and confirm proper reception of the broadcast to be recorded.

② Push ONE TOUCH RECORD Button.

- Timer Indicator Lamp lights and the first O.T.R. Time Indicator Lamp (30) lights up after 1 push (see chart below).
- All functions except the Power Switch and VCR/TV Selector Switch will become inoperable.
- The Timer will display the present time.
- Be sure to select the channel first.

Selection of recording time using O.T.R. Button.

O.T.R. Button	Recording Time (minute)	O.T.R. Time Indicator Lamp
1 push	30	30
2 push	60	60
3 push	90	90
4 push	120	120
5 push	0	
6 push (=1 push)	30	30

- Each time the O.T.R. Button is pushed, the O.T.R. Time Indicator Lamp will change as shown in the diagram on the left.
- When the selected recording time is over, the O.T.R. Time Indicator Lamp will go out.
- If you wish to stop the One Touch Recording, push the O.T.R. Button repeatedly until the O.T.R. Time Indicator Lamp goes out or set the Power Switch OFF.

- After One Touch Recording, the VCR turns OFF automatically.

For Example

To stop O.T.R. during a recording.	Normal Operation	To extend the O.T.R. time.
<p>30 60 90 120</p> <p>push repeatedly ↓</p> <p>30 60 90 120</p> <p>8 seconds later</p> <p>the O.T.R. will stop, and the VCR will turn off</p>	<p>2 pushes</p> <p>30 60 90 120</p> <p>1 push ←</p> <p>60 minutes later</p> <p>30 60 90 120</p> <p>the O.T.R. will stop, and the VCR will turn off</p>	<p>2 pushes →</p> <p>30 60 90 120</p> <p>2 more hours of recording</p>

Caution for One Touch Recording during Timer Recording;

- If the preset time for a Timer Recording comes up during a One Touch Recording, the One Touch Recording will take priority.
- The recording time can be made longer by pushing the O.T.R. Button during a Timer Recording or a One Touch Recording.
- If the O.T.R. is set during a Timer setting, the VCR will return to the Timer mode after the O.T.R..
- If the O.T.R. Button is pushed while a Timer Recording is being set, the One Touch Timer will begin recording on the last channel which was set.

NOTE:

- The Remote Control will not function during One Touch Recording.

VHS-PRINCIPLE OF OPERATION

Basic Video Tape Recording

To understand the VHS format, it is wise to first review the basic principles of video tape recording.

Like audio tape recording, video information is stored on magnetic tape by means of a small electromagnet, or head. The two poles of the head are brought very close together but they do not touch. This creates magnetic flux to extend across the separation (gap), as shown: Fig. 1.

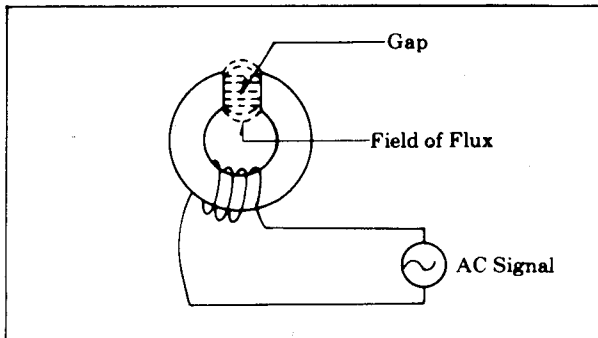


Fig. 1.

If an AC signal is applied to the coil of the head, the field of flux will expand and collapse according to the rise and fall of the AC signal.

When the AC signal reverses polarity, the field of flux will be oriented in the opposite direction and will also expand and collapse.

This changing field of flux is what accomplishes the magnetic recording. If this flux is brought near a magnetic material, it will become magnetized according to the intensity and orientation of the field of flux. The magnetic material used is oxide coated (magnetic) tape.

Using audio tape recording as an example, if the tape is not moved across the head, just one spot on the tape will be magnetized and will be continually re-magnetized. If the tape is moved across the tape, specific areas of the tape will be magnetized according to the field of flux at any specific moment. A length of recorded tape will therefore have on it areas of magnetization representing the direction and intensity of the field of flux. For instance:

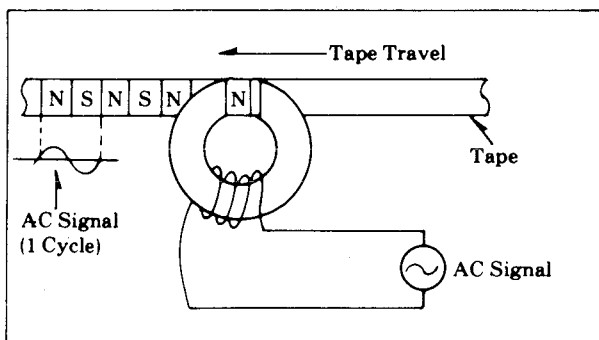


Fig. 2.

The tape will have differently magnetized regions, which can be called North (N) and South (S), according to the AC signal. When the polarity of the AC signal changes, so does the direction of magnetization on the tape, as shown by one cycle on the AC signal (see Fig. 2). If the recorded tape is then moved past a head whose coil is connected to an amplifier, the regions of magnetization on the tape will set up flux across the head gap which will in turn induce a voltage in the coil to be amplified. The output of the amplifier, then is the same as the original AC signal. This is essentially what is done in audio recording, with other methods for improvement like bias and equalization.

There are some inherent limitations in the tape recording process which do effect video tape recording, so they will be examined now.

As shown in Fig. 2, the tape has North and South magnetic fields which change according to the polarity of the AC signal. What if the frequency of the AC signal were to greatly increase?

If the speed of the tape past the head (head to tape speed) is kept the same, the changing polarity of the high frequency AC signal would not be faithfully recorded on the tape, as shown in Fig. 3.

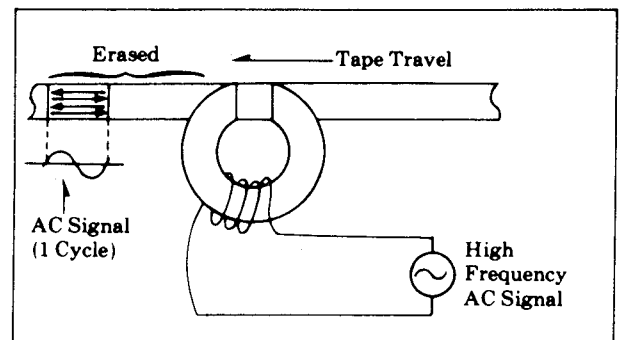


Fig. 3.

As the high frequency AC signal starts to go positive, the tape will start to be magnetized in one direction. But the AC signal will very quickly change its polarity, and this will be recorded on much of THE SAME PORTION of the tape, so North magnetic regions will be covered by South magnetic regions and vice versa. This results in zero signal on the tape, or self-erasing. To keep the North and South regions separate, the head to tape speed must be increased. (See Fig. 3.)

When recording video, frequencies in excess of 4 MHz may be encountered. Through experience, it is found that the head to tape speed must be in the region of 10 meters per second in order to record video signals.

The figure of 10 meters per second was also influenced by the size of the head gap. Clearly, the lower the head to tape speed, the easier it is to control that speed. If changes in head gap size were not made, the necessary head to tape speed would have been considerably higher. How the gap size influences this can be explained by Fig. 4.

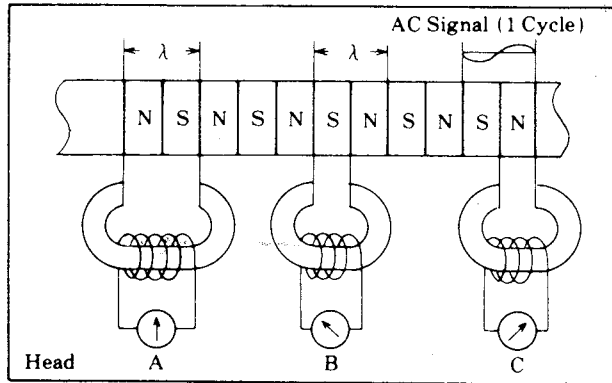


Fig. 4.

Assume a signal is already recorded on the tape. The distance on the tape required to record one full AC signal cycle is called the **RECORDED WAVELENGTH** or λ . Head A has a gap width equal to λ . Here, there is both North and South oriented magnetization across the gap.

This produces a net output of zero since North and South cancel. Head B and C have a maximum output because there is just one magnetic orientation across their gaps.

Maximum output occurs in heads B and C therefore, because their gap width is $1/2\lambda$. (Heads B and C would also work if their gap width is less than $1/2\lambda$.) The same is also true for recording. The maximum useable (no self-erasing) transfer of magnetic energy to the tape occurs when the gap width, G , can be expressed as.

$$G \leq \frac{\lambda}{2}$$

The **RECORDING WAVELENGTH**, can be expressed as:

$$\lambda = \frac{V}{f} \quad \text{where } V \text{ is the head to tape speed and } f \text{ is the frequencies to be recorded.}$$

So, $G \leq \frac{V}{2f}$, as V increases, G is also allowed to increase for the same **MAXIMUM** frequency. Conversely if G is made very small, V is allowed to be reduced.

In practice, G can be made as small as (and smaller than) $1\mu\text{m}$ (1×10^{-6} meters) and this puts V in the area of 10 meters per second.

A head to tape speed of 10 meters per second is a very high speed, too high in fact to be handled accurately by a reel to reel tape machine of reasonable size. Also, tape consumption on a high speed reel to reel machine is tremendous.

The method employed in video recording is to move the video heads as well as the tape. If the heads are made to move fast, across the tape, the linear tape speed can be kept very low.

In 2-head helical video recording (the only format which will be discussed here) the video heads are mounted in a rotating drum or cylinder, and the tape is wrapped around the cylinder. This way, the heads can scan the tape as it moves. When a head scans the tape, it is said to have made a **TRACK**. This can be seen in Fig. 5.

In 2-head helical format, each head, as it scans across the tape will record one TV field, or 262.5 horizontal lines. Therefore, each head must scan the tape 30 times per second to give a field rate of 60 fields per second.

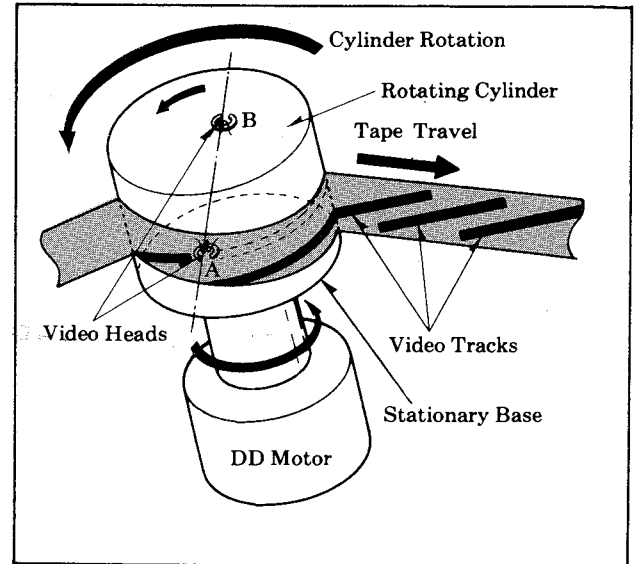


Fig. 5.

The tape is shown as a screen wrapped around the head cylinder to make it easy to see the video head. There is a second video head 180° from the head shown in front. Because the wraps around the cylinder in the shape of a helix (helica) the video tracks are made as a series of slanted lines. Of course, the tracks are invisible, but it is easier to visualize them as line. The two heads "A" and "B" make alternate scans of the tape.

An enlarged view of the Video tracks on the tape can be shown: Fig. 6

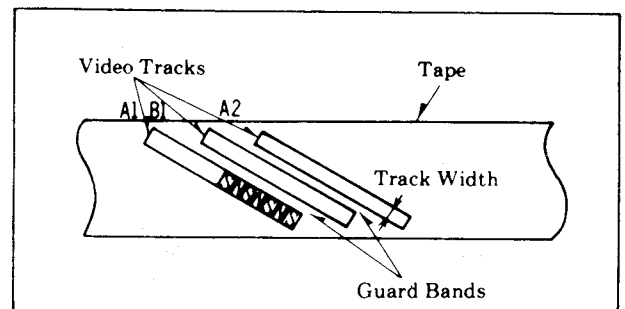


Fig. 6.

Refer to Fig. 6. The video tracks are the areas of the tape where video recording actually takes place. The guard bands are blank areas between tracks, preventing the adjacent track's crosstalk from appearing on the track where the video head is tracking.

There is one more point about video recording which will be discussed here. Magnetic heads have the characteristic of increased output level as the frequency increases. Then, as determined by the gap width, the maximum output occurs at

$$\text{approximately } G = \frac{V}{2f}$$

In practice, the lower frequency output of the heads is boosted in level to equal the level of the higher frequencies. This process, as also used in audio applications, is called equalization.

Video frequencies span from DC to about 4 MHz. This represents a frequency range of about 18 octaves. 18 octaves is too far a spread to be handled in one system (one machine). For instance, heads designed for operation at a maximum frequency of 4 MHz will have very low output at low frequencies. Since there is 6 dB/octave attenuation, $18 \times 6 = 108$ dB difference appears. In practice this difference is too great to be adequately equalized. To get around this, the video signal is applied to an FM modulator during recording. This modulator will change its frequency according to the instantaneous level of the video signal.

The energy of the FM signal lies chiefly in the area from about 1 MHz to 8 MHz, just three octaves. Heads designed for use at 8 MHz can still be used at 1 MHz, because the output signal can be equalized. Actually speaking, heads are designed for use up to about 5 MHz. Therefore, some FM energy is lacked but it does not affect the playback video signal, because it is resumed in the playback process.

Upon playback, the recovered FM signal must be equalized then demodulated to obtain the video signal.

CONVERTED SUBCARRIER DIRECT RECORDING METHOD

The one method of color video recording that will be discussed here is the converted subcarrier method. In order to avoid visible beats in the picture caused by the interaction of the color (chrominance) and brightness (luminance) signals, the first step in the converted subcarrier method is to separate the chrominance and luminance portions of the video signal to be recorded. The luminance signal, containing frequencies from DC to about 4 MHz, is then FM recorded, as previously described. The chrominance portion, containing frequencies in the area of 3.58 MHz is down-converted in frequency in the area of 629 kHz. Since there is not a large shift from the center frequency of 629 kHz, this converted chrominance signal is able to be recorded directly on the tape. Also note that the frequencies in the area of 629 kHz are still high enough to allow equalized playback. In practice, the CONVERTED CHROMINANCE signal and the FM signals are mixed and then simultaneously applied to the tape. Upon playback, the FM and converted chrominance signals are separated. The FM is demodulated into a luminance signal again. The converted chrominance signal is reconverted back up in frequency area of 3.58 MHz. The chrominance and luminance signals are combined which reproduces the original video signal.

1. VIDEO HEAD

A. The Need for New Video Heads

We have already discussed the reduced track width. This reduction requires the use of a smaller video head. Just making them smaller does not make them better. With less of actual head material to work with, the magnetic properties of the head suffers. To offset this a change in the head material is in order. Because the VHS recorder is designed to be small, a reduction in the size of the head cylinder was called for.

A reduction in the size (diameter) of the head cylinder changes the head to tape speed. Remember, the head to tape speed affects the high frequency recording capability of the head.

To offset this problem, the head gap size was reduced.

As is well-known, Azimuth Recording is utilized in VHS. The heart of the Azimuth Recording process is in the video heads themselves. This requires still another change in head design.

B. Head Gap

1. Width

As explained, the need for smaller head gap size became apparent. In VHS, the video heads have gap widths of a mere $0.3\mu\text{m}$ (0.3×10^{-6} meters).

This is quite a contrast with ordinary video heads used in other helical applications whose gap widths are typically in the area of $1\mu\text{m}$.

2. Azimuth

Azimuth is the term used to define the left to right tilt of the gap if the head could be viewed straight on. In previous VTR applications the azimuth was always set to be perpendicular to the direction of the head travel across the tape, or more simply, the video track. Fig. 7 helps explain this.

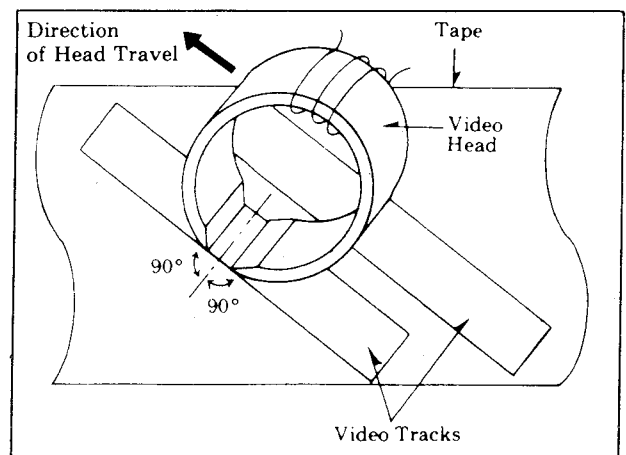


Fig. 7.

Fig. 7 shows that the gap is perpendicular to (90°) the head's movement across the tape. We can think of this standard as a perfect azimuth of 0° .

In VHS, the video heads have a gap azimuth other than 0° . And more, one head has a different azimuth from the other. The 2 values used in VHS are azimuth of $+6^\circ$ and -6° . Refer to Fig. 8 and Fig. 9.

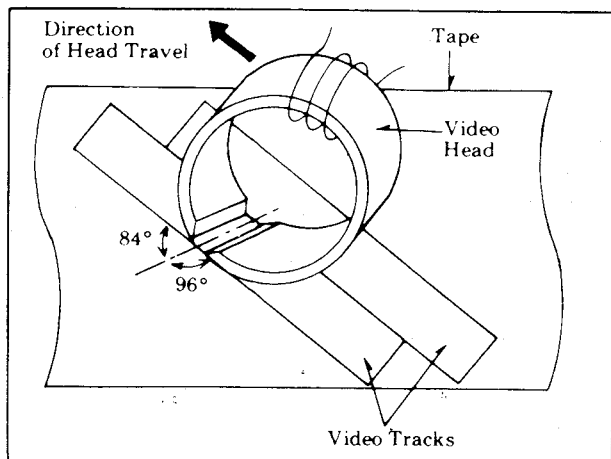


Fig. 8.

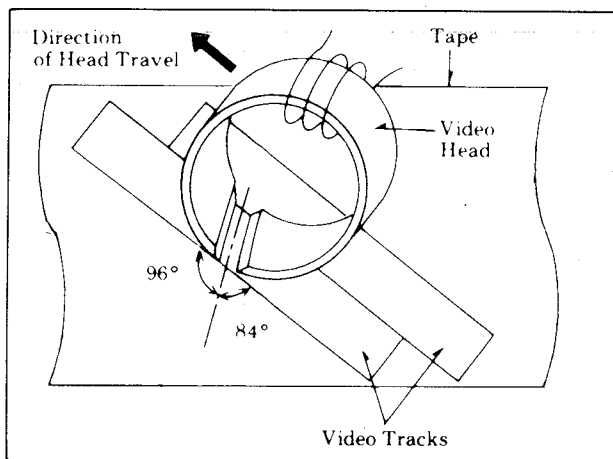


Fig. 9.

These heads make the VHS format different from most other VTR formats. Exactly how the azimuths of $\pm 6^\circ$ helps to keep out adjacent track interference is explained next.

2. AZIMUTH RECORDING

Azimuth Recording is used in VHS to eliminate the interference or crosstalk picked up by a video head. Again, because adjacent video tracks touch, or crosstalk, a video head when scanning a track will pick up some information from the adjacent track. The azimuths of the head gaps assure that video head "A" will only give an output when scanning across a track made by head "A". Head "B", therefore, only gives an output when scanning across a track made by head "B". Because of the azimuth effect, a particular video head will not pick up any crosstalk from an adjacent track. Let's examine this more closely.

In Fig. 10, we can see the VHS/SLP for example, video tracks with not-to-scale North and South magnetized regions on them.

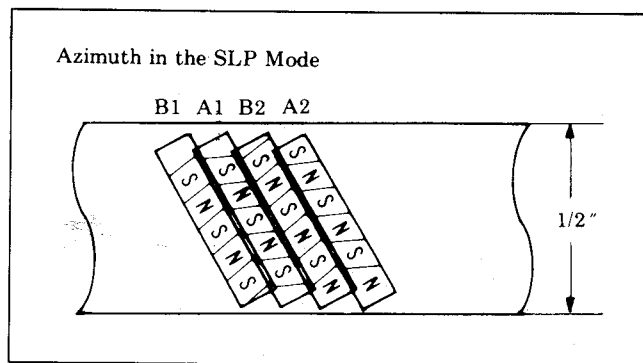


Fig. 10.

It can also be seen that these N or S regions are not perpendicular to the track, they have -6° azimuth in tracks A1, A2; and $+6^\circ$ azimuth in tracks B1, B2.

If we take track A1 and darken the N regions, it becomes easier to see. Refer to Fig. 11.

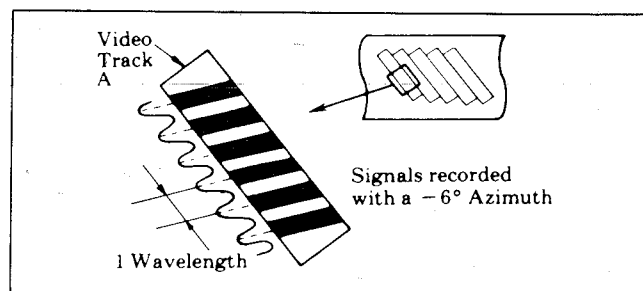


Fig. 11.

In Fig. 12, we see the information on track A, made by head "A". Imagine now that head "A" is going to playback this track, by superimposing the head over the track. Clearly, the gap fits exactly over the N and S regions, so that at any moment there is either an N region or an S region or an N to S (or S to N) transition across the gap. This produces maximum output in head "A". Now, visually superimpose the "B" head over the track.

Here there are N and S regions across the gap at the same time, at any given moment. Remember that simultaneous N and S regions across the gap cause cancellation, and therefore no output. Looking at Fig. 9, we can see that the gap width is equal to $1/2$ the recorded wavelength. Recall that this occurs at the highest frequency which is to be recorded.

So therefore, the azimuth effect works at these high frequencies.

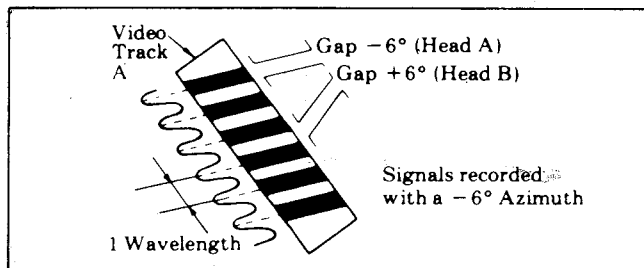


Fig. 12.

But what happens at lower frequencies? In Fig. 13, we see a diagram similar to Fig. 12, except the recorded wavelength is longer, which represents a lower frequency.

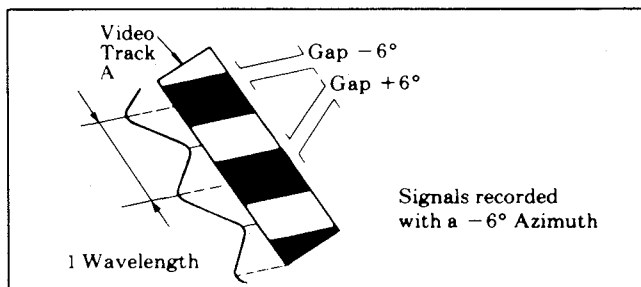


Fig. 13.

Again, visually superimpose the heads over the track. Head "A" is the same as before. But look at head "B". There is much less cancellation across the gap, and its output is close to that of head "A". Therefore, we see where the azimuth effect is dependent on frequency. The higher the frequency, the better the azimuth effect. The lower the frequency, the lower the separation by azimuth effect.

3. VHS COLOR RECORDING SYSTEM

Because there is insignificant azimuth effect at lower frequencies, a new color recording system must be adopted.

The fact that crosstalk occurs at lower frequencies cannot be changed, this happens right at the tape during playback.

The method adopted processes the crosstalk component signals from the heads so that they are eliminated. It is important to realize that the crosstalk DOES STILL OCCUR. It is the recording/playback circuitry that performs the elimination.

In ordinary Helical VTR's using converted subcarrier direct recording, the phase of the chrominance signal is untouched, recorded directly onto the tape. The chrominance signal and its phase can be represented by vectors. Vectors graphically represent the amplitude and phase of ONE frequency. In this discussion, we will consider (for simplicity) the chrominance signal to be of one frequency. As an example of vectors, see Fig. 14.

The length of any vector represents its amplitude.

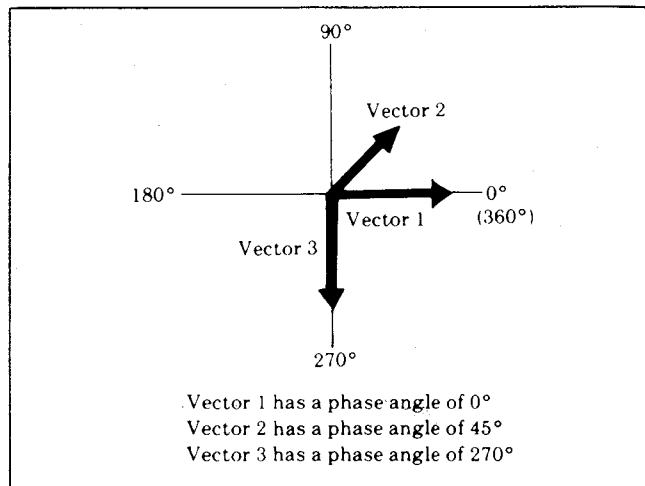


Fig. 14.

We know that the azimuth effect will not work at the lower frequencies. And since the color information in VHS is recorded at low-converted frequencies, a new method of color recording was adopted.

Vector Rotation in Recording is actually a phase shift process that occurs at a horizontal rate, 15,734Hz.

The chrominance signal can be represented by a vector, showing amplitude and phase. (↑)

In ordinary Helical Scan VTR's the vector is of the same phase for every horizontal line, on every track as shown in Fig. 15.

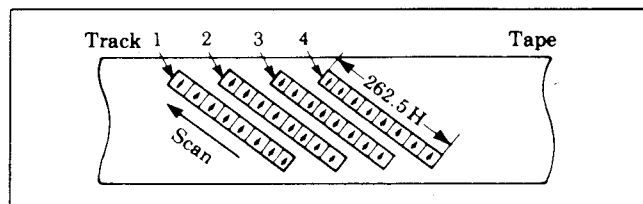


Fig. 15.

In VHS, we still convert the 3.58 MHz down to a lower frequency, namely 629 kHz, but the new color method used in VHS format is a process of vector rotation. During recording the CHROMINANCE phase of each horizontal line is shifted by 90°.

For head "A" (CHANNEL 1) we ADVANCE the CHROMINANCE phase by 90° per horizontal line (H).

For head "B" (CHANNEL 2) we DELAY the chrominance phase 90° per H.

VECTOR (PHASE) ROTATION:

CHANNEL 1 +90°/H

CHANNEL 2 -90°/H

Fig. 16 shows what this looks like on tape.

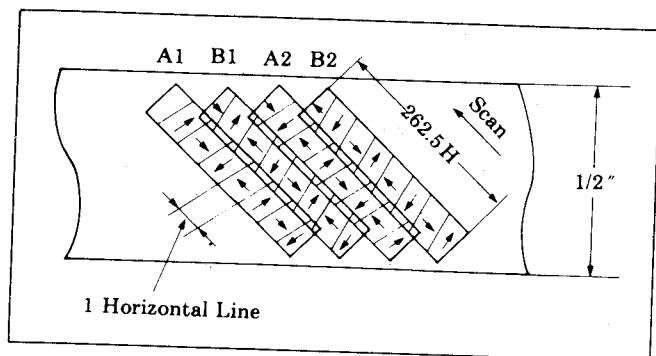


Fig. 16.

Now assume that head "A" plays back over track A1 it will produce a vector output as such:

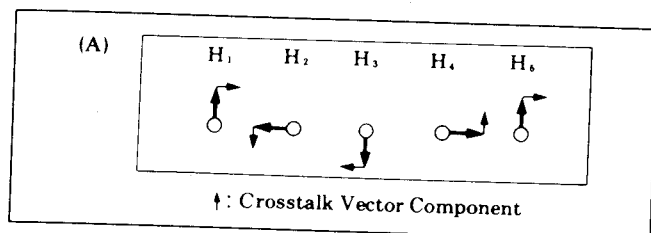


Fig. 17.

Head "A" when tracking over A1 will have an output consisting of the main signal (large vectors) and some crosstalk components (small vectors).

Fig. 17, then is a vector representation of the playback chrominance signal from the head.

One of the most important things down in the playback process is the restoration of the vectors to their original phase. This is done by the balanced modulator in the playback process.

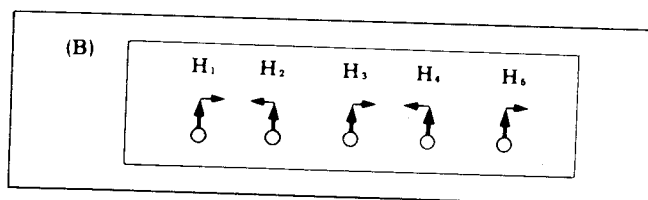


Fig. 18.

This restored signal is then split 2 ways. One path goes to one input of an adder. The other path goes to a delay line which delays the signal by 1 H. The output of the delay line goes to the other input of the adder. Fig. 19 explains. As can be seen in Fig. 21, the crosstalk component has been eliminated after the first H line. We have now a chrominance signal free of adjacent channel crosstalk.

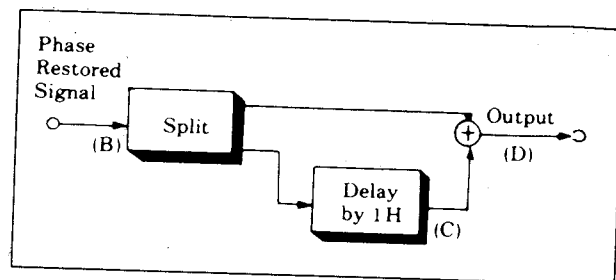


Fig. 19.

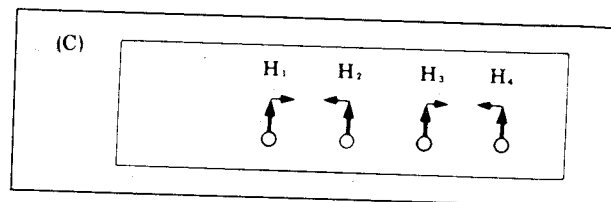


Fig. 20.

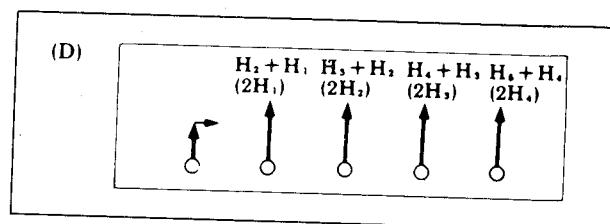


Fig. 21.

The double output in Fig. 21 is not a problem because it can always be reduced. The process of adding a delayed line to an undelayed line is permissible because any 2 adjacent lines in a field contain nearly the same chrominance information.

So, if 2 adjacent lines are added, the net result will produce no distortion in the playback picture.

In conjunction with the crosstalk elimination is the re-conversion of the chrominance 629 kHz to its original 3.58 MHz. Now the color signal is totally restored.

GLOSSARY OF TERMS

ACC

Automatic Color Control used to maintain an overall constant color signal level in the color circuits.

ACK

Automatic Color Killer.

Adjacent Track

This is the name of the video track to the immediate left or right of the track of concern.

AFC

Automatic Frequency Control used to phase-lock the color circuits to either the recording or playback color signal, in order to achieve a stable color signal.

AFT

Automatic Fine Tuning.... This is a special circuit found in most recent TV sets which makes the local oscillator of the TV tuner follow the channel of concern in order to produce a stable IF frequency. In other words, if for any reason the TV station being received changes frequency, the AFT circuit will automatically compensate so that no interference will be seen on the screen, i.e., no manual fine tuning is necessary.

AGC

Automatic Gain Control used to maintain an overall constant picture level in the luminance circuits.

APC

Automatic Phase Control used to help phase lock the color circuits to either the recording or playback color signal in order to achieve a stable color signal.

Azimuth

A term used to describe the left to right tilt of the gap of a recording head, if it could be viewed straight on.

Balanced Modulator

A circuit so designed to give as an output the frequency sum or frequency difference of its two input signals. Any special characteristics of one of the input signals will be present in the output signal.

Beats

A term used to describe the unwanted signals produced when two original signals are allowed to be mixed together.

Bipolar PG

Pulse Generator signals that have both positive and negative excursions.

Burst

A short time occurrence (8 to 10 cycles) of the 3.58 MHz subcarrier signal, appearing right after horizontal sync but centered on the blanking portion of the video waveform. Burst is used to keep the color oscillator of a TV receiver locked to the broadcast station.

B/W

Abbreviation for Black and White.

C

Capacitor.

C Signal

The color portion of a video signal.

Capstan

A small rotating metal dowel which drives the recording tape to assure positive tape movement.

Chroma

The color portion of a video signal.

Chrominance

The color portion of a video signal.

Clamp

The process of giving an AC signal a specific DC level.

Control Signal

A special signal recorded onto the video tape which is used during playback as a reference for the servo circuits.

Converted Subcarrier

This is the process of frequency shifting the color 3.58 MHz subcarrier and its sidebands down to 629 kHz.

Crosstalk

The name given to the unwanted signals obtained when a video head picks up information from an adjacent track.

CUE

To scan the playback picture at a faster than normal speed in the Forward direction.

D

Diode.

DL

Delay Line.

DDC

Direct Drive Cylinder...as used in VHS, this means that the video heads are driven by a self-contained brushless DC motor using no belts or gears. DD cylinders produce pictures with better stability.

Dark Clip

After emphasis, the negative going spikes (undershoot) of a video signal may be too large in amplitude for safe FM modulation. A dark clip circuit is used to cut off these spikes at an adjustable level.

Delta Factor (Δf)

A term used to indicate that a playback signal off the video tape has some jitter or "wow and flutter". Δf , or "a change in frequency" means that the color signal off the tape is not a stable frequency of 629 kHz, but rather a signal whose frequency at any instant is some small amount above or below 629 kHz.

Deviation

A term used to describe how far the FM carrier swings when it is modulated. In VHS the upper limit is 4.4 MHz.

Dew Detector

A variable resistor whose resistance value depends upon the ambient humidity.

Dihedral

A term used to describe the relative position between the two video heads as they are mounted in the head cylinder. Perfect dihedral means that the tips of the heads are exactly 180° apart.

Dropout

A momentary absence of FM or color signal off the tape, whether due to uneven oxide or a coating of dust on the tape or video heads.

Duty Cycle

In describing a rectangular waveform, the "duty" refers to the percentage of off time and on time for one complete cycle. 50-50 means that there are equal periods of off time and on time for one cycle and this would be a square wave.

E-E

Electronics to Electronics...this is the picture viewed on the TV set when a recording is being made. This picture goes through some but not all of the circuits of the recorder and is used to test the operation of said circuits.

EQ

Shortened form of "Equalization", used in the audio circuits.

Emphasis

The process of boosting the level of the high frequency portions of the video signal.

FG

Frequency Generator used in the servo circuits.

FL

Filter.

FM Signal

The luminance portion of the video signal is used to control the frequency of a stable multivibrator. The output of this multivibrator is a frequency modulated (FM) signal shifting from 3.4 MHz to 4.4 MHz (puls sidebands).

Field

One half of a television picture. A field consists of 262.5 horizontal scanning lines across the picture tube. Two fields are necessary to complete a fully scanned TV picture (frame). First, one field is "sprayed" on the picture tube, starting at the top of the tube with Line 1, and ending at the bottom with Line 262.5. Then, the next field begins at the top of the tube again with Line 262.5 and ends at the bottom with Line 525. The lines of the second field lie in-between the lines of the first field. This property of falling in-between lines is called "interlacing". The two sweeps of the picture tube, or two fields make up one complete TV picture or "frame". Frame repetition is 30 Hz, therefore field repetition is 60 Hz.

Flagwaving

This is the term used to describe a TV set's ability to accept unstable playback pictures from a video tape recorder. All home VTR's have some degree of playback instability. A TV set with a long horizontal AFC time constant may not recover from the VTR's instability before the active picture is being scanned. This can cause a bending or flapping from side to side of the top inch or so of the screen. This movement is called "flagwaving".

Frame

One complete TV picture. See "Field".

Gate

A circuit which will deliver an output only when a specific combination of its inputs are present. For use in analog or digital applications.

Guard Band

This is the space between video tracks on the video tape in the SP mode. Guard bands contain no information.

Hall Effect IC

An external magnetic field causes current to flow in this type of device.

HD

Horizontal Drive signal.

Head Cylinder

A cylindrical piece of metal which houses the video heads. The tips of the heads protrude slightly from the surface of the cylinder so that they may scan the tape as the cylinder spins.

Head Switching

The action of turning off during playback, the video head which is not in contact with the video tape. A particular video head will be turned off 30 times per second. This is done so that the head which is not scanning the tape, and therefore not delivering a good signal, cannot contribute any noise to the playback signal.

Head Switching Pulse

The signal which is applied to the Head Amplifier to perform head switching. This is a square wave at 30 Hz, with a 50-50 duty cycle.

Helical

A word used to describe a general type of VTR in which the tape wraps around the video head cylinder in the shape of a 3-dimensional spiral, or "helix". The video tracks are recorded as a series of slanted lines.

IC

Integrated Circuit.

Interchangeability

A term used to describe how well a particular VTR will play back a tape recorded on another VTR of the same type. Good interchangeability indicates good playback.

Interlacing

The property of the scan lines of two television fields to lie in-between each other. See "Field".

Interleaving

A term used to indicate that the harmonics of the chrominance signal lie in-between the harmonics of the luminance portion of the video signal as it is viewed on a spectrum analyzer. This means that the color information of a video signal does not interfere with, although it is broadcast at the same time as, the luminance information.

Also, signals which have this interleaving property are not readily seen on a TV screen, because of their virtual cancellation characteristics.

Interleaving signals (fi) must have the following frequency relationship:

$$f_i = \left(\frac{2n+1}{2}\right) \times f_H \quad (n=0, 1, 2, 3, 4, \dots)$$

$$f_H = 15,734 \text{ Hz (H sync frequency)}$$

Jitter

The name of the effect on the playback picture if a VTR has too much "wow and flutter". The picture appears to have a rapid shaking movement.

L

Coil.

Luminance

This is the portion of video signal which contains the sync and B/W information.

MMV

Monostable Multi-Vibrator...Usually an IC device which gives a logic high or low output with a variable duration upon receipt of an input pulse or transition.

Non-Linear Emphasis

This is similar to regular emphasis with the difference that small level high frequency portions of the signal are given more of a boost than higher level high frequency portions.

NTSC

The National Television Systems Committee. These four letters identify the United States color television standard.

O.T.R.

One Touch Recording (O.T.R.) enables you to do impromptu timer recordings at any time. When you have to go out for urgent matters or you are going to sleep, this function is very use Pul. Just select the channel and push the O.T.R. Button for 30 minutes to 2 hours of recordings. After recording, the VCR will be turned off automatically.

PG

Pulse Generator used in the servo circuits.

Q

A term used to describe the graphic response of a filter or tuned amplifier.

R

Resistor.

Review

To scan the playback picture at a faster than normal speed in the Reverse direction.

RF

Radio Frequencies.

Rotary Chroma

The name of the process used in VHS to change the phase of the chrominance signal at a rate of 15,734 (same as H sync frequency) times per second.

Rotary Transformer

A device used to magnetically couple RF signals to and from the spinning video heads, thus eliminating the need for brushes.

Sample and Hold

A process used in comparator circuits by which the value of a particular signal is measured at a specific moment in time ...then this value is stored for later use.

Search

To scan the playback picture at a faster than normal speed in either the forward or reverse direction.

Servo

Short for Servo mechanism. This is an electro-mechanical device whose mechanical operation (for instance motor speed) constantly being measured and regulated so that it closely matches or follows an external reference.

Skew

Another way of saying Tension Error. Skew is actually the change of size or shape of the video tracks on the tape from the time of recording to the time of playback. This can occur as a result of poor tension regulation by the VTR, or by ambient conditions which affect the tape.

Subcarrier

The name of the 3.58 MHz continuous wave signal used to carry color information.

SS

Slow and Still.

T

Transformer.

TP

Test Point.

TR

Transistor.

Tension Error

See "Skew".

Time Base Stability

A term used to describe how closely the playback video signal from a VTR matches an external reference video signal...in regard to sync timing rather than picture content.

Tracking

This is the action of the spinning video heads during playback when they accurately track across the video RF information laid down during recording. Good tracking indicates that the heads are positioning themselves correctly, and are picking up a strong RF signal. Poor tracking indicates that the heads are off track, and picking up low level RF signal or noise.

VCO

Voltage Controlled Oscillator...An oscillator whose frequency of oscillation is governed by an external voltage.

Video Head

This is the electro-magnet used to develop magnetic flux which will put RF information on the tape. In VHS, two video heads are mounted in a rotating cylinder around which the video tape is wrapped. As the cylinder spins, each video head is allowed to alternately scan the tape.

Video Track

The name of the RF information laid down during recording, as a particular video head scans across the tape.

VHS

Video Home System.

VTR

Video Tape Recorder.

VV

Video to Video...or...the actual playback picture produced from a tape during playback.

VXO

Voltage Controlled Crystal Oscillator...Similar to VCO except that a quartz crystal is used as a reference which can be varied.

White Clip

After emphasis, the positive going spikes (overshoot) of the video signal may be too large for safe FM modulation. A white clip circuit is used to cut off these spikes at an adjustable level.

XTAL

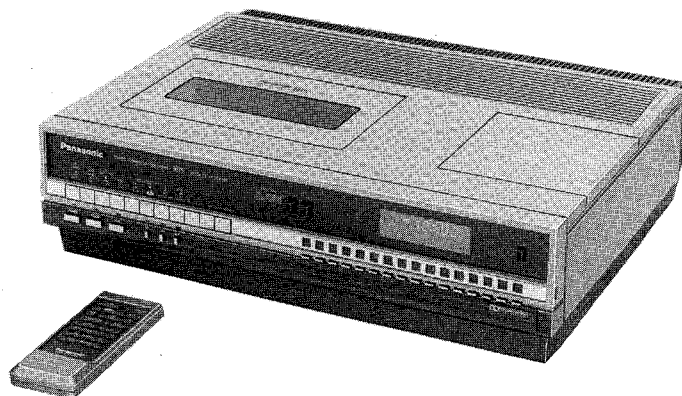
Abbreviation for crystal.

Y Signal

The B/W portion of a video signal containing B/W information and sync.

Service Manual

Video Cassette Recorder

Vol. 2
Panasonic
 Omnivision **VHS**
PV-1780**Mechanical Adjustment****Procedures****Electrical Adjustment****Procedures****SPECIFICATIONS**

Power Source: 120 V AC $\pm 10\%$, 60 Hz $\pm 0.5\%$
Power Consumption: Approx. 47 watts
Television System: EIA Standard (525 lines, 60 fields)
 NTSC color signal
Video Recording
 System: 4 rotary heads helical scanning system
 Luminance: FM azimuth recording
 Chrominance: Converted subcarrier phase shift recording
Audio Track: 2 track
Tape Format: Tape width 1/2" (12.7 mm), high density tape
Tape Speed: SP mode: 1-5/16 i.p.s (33.35 mm/s)
 LP mode: 2 1/32 i.p.s (16.67 mm/s)
 SLP mode: 7/16 i.p.s (11.12 mm/s)
Record/Playback Time: 360 min. with NV-120 used in SLP mode
FF/REW Time: Less than 6 min with NV-T120
Heads: Video: 4 rotary heads
 Audio: 2 stationary heads/
 Control: 1 stationary head
Erase: 1 full track erase
 1 audio track erase for audio dubbing
Input Level: Video: Video IN Jack (RCA type)
 1.0 Vp-p, 75 Ω unbalanced
 Audio: MIC IN Jack (Right, left)
 -70 dB, 4 k Ω unbalanced
 Audio IN Jack (RCA type)
 -20 dB, 100 k Ω unbalanced
 TV Tuners: VHF Input: Ch2-Ch3,
 cable channels "A"—"W"
 75 Ω unbalanced
 UHF Input: UHF Ch14-Ch83,
 300 Ω balanced
Output Level: Video: Video OUT Jack (RCA type)
 1.0 Vp-p, 75 Ω unbalanced
 Audio: Audio OUT Jack (RCA type)
 (Right, left)
 -9 dB, 600 Ω unbalanced
RF Modulated: Channel 3 or 4
 72 dB μ , (Open voltage)
 75 Ω unbalanced

Video Horizontal

Resolution: Color: more than 230 lines
 B/W: more than 270 lines

Audio Frequency

Response: SP mode: 100 Hz ~ 8 kHz
 LP mode: 100 Hz ~ 6 kHz
 SLP mode: 150 Hz ~ 5 kHz (10 dB down)

Signal-to-Noise Ratio: Video: better than 40 dB
 (Rohde & Schwarz noise meter)
 Audio: SP mode: better than 42 dB
 LP mode: better than 40 dB
 SLP mode: better than 40 dB
 (Dolby NR ON)

Operation

Temperature: 41°F—104°F (5°C—40°C)
Operating Humidity: 10%—75%
Weight: 25.3 lbs (11.5 kg)
Dimensions: 18-7/8" (W) \times 14-1/4" (D) \times 5-3/8" (H)
 (480 mm \times 356 mm \times 136 mm)

Accessories Supplied:

- Blank tape
- Wireless remote control unit
- 75 Ω —300 Ω matching transformer
- 300 Ω —75 Ω matching transformer
- Coaxial cable (5 ft) with F type connectors
- Twin lead wire (5 ft)
- Dust cover
- Vertical-Lock tool

Available Tapes:

1/2" VHS video cassette tapes
 NV-T120 Approx. 810 ft. (247 m),
 2, 4 or 6 hrs.
 NV-T60 Approx. 417 ft. (127 m),
 1, 2 or 3 hrs.

Weight and dimensions shown are approximate. Specifications are subject to change without notice.

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MECHANICAL ADJUSTMENT PROCEDURES

1. DISASSEMBLY FLOWCHART

This Flowchart indicates disassembly steps of the cabinet parts and the Bottom P.C. Boards in order to find the item(s) necessary for servicing. When reassembling, perform the step(s) in the reverse order.

Notes:

1. When removing the front panel, work with care so as not to break the locking portions of the panel.
2. The adjustments are required when the Cassette Guide and Cassette Up Holder were replaced.

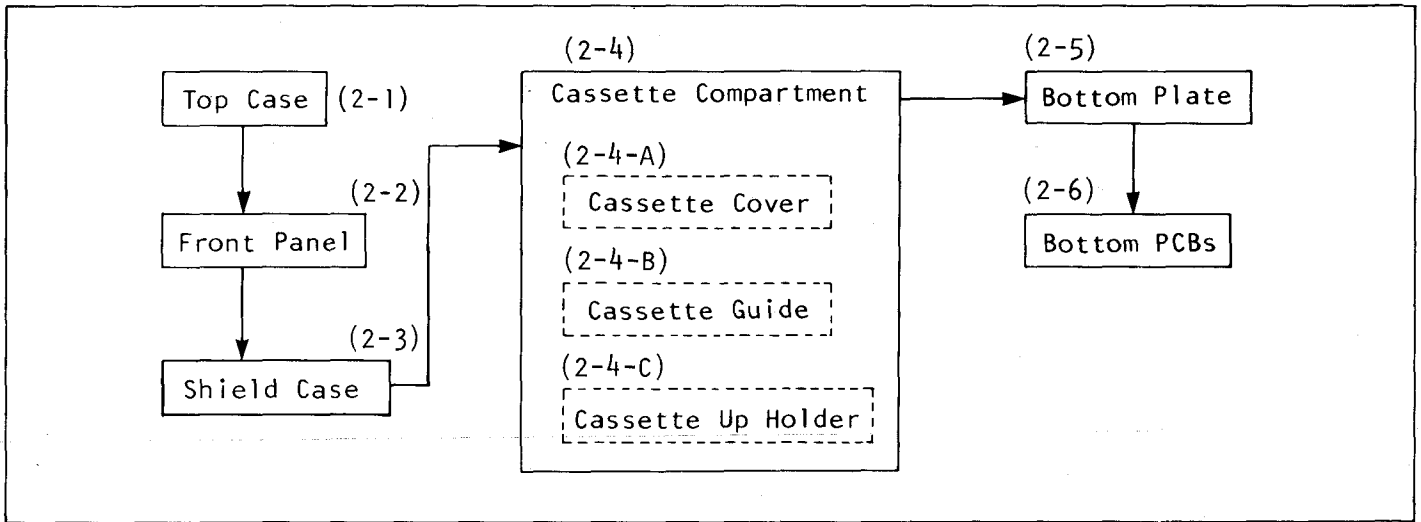


Fig. M1 Disassembly Flowchart

2. DETAILED DISASSEMBLY METHOD

2-2. Removal of the Front Panel

2-1. Removal of the Top Case

Remove 2 screws (A). Then carefully lift the rear portion and then pull it towards the back to remove.

Release 3 locking tabs. While holding both the right and left sides of the panel, carefully turn it toward the front of the instrument and remove.

Note:

When reinstalling, be sure the felt pad on the counter/memory switch is in place.

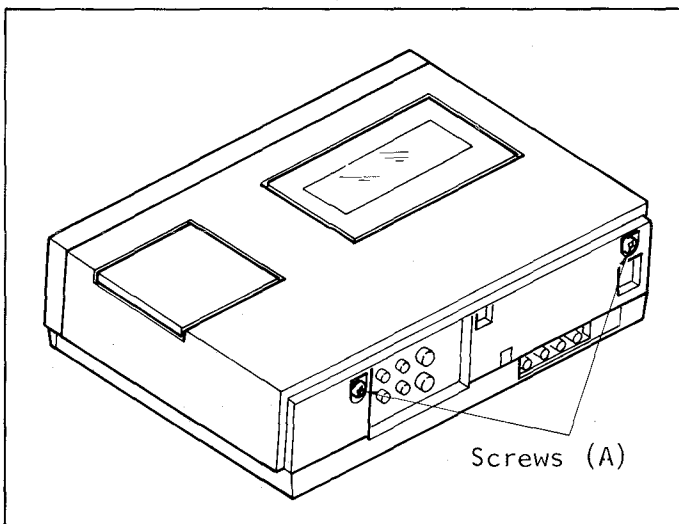


Fig. M2 Removal of the Top Case

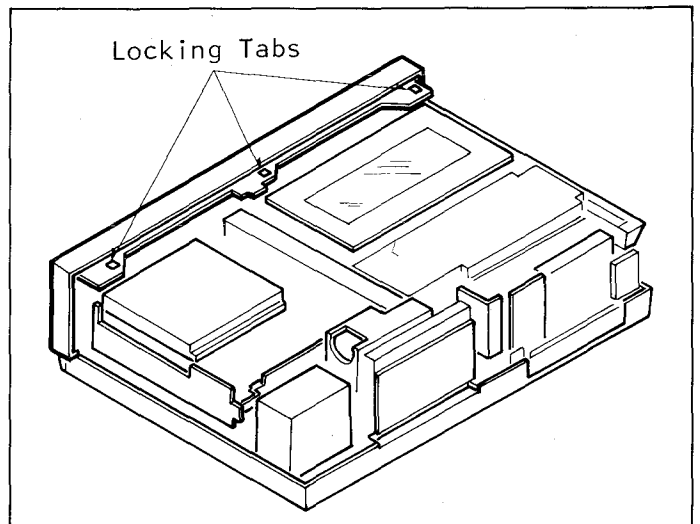


Fig. M3 Removal of the Front Panel

2-3. Removal of the Shield Case

Remove 6 screws (B) and carefully lift the shield case.

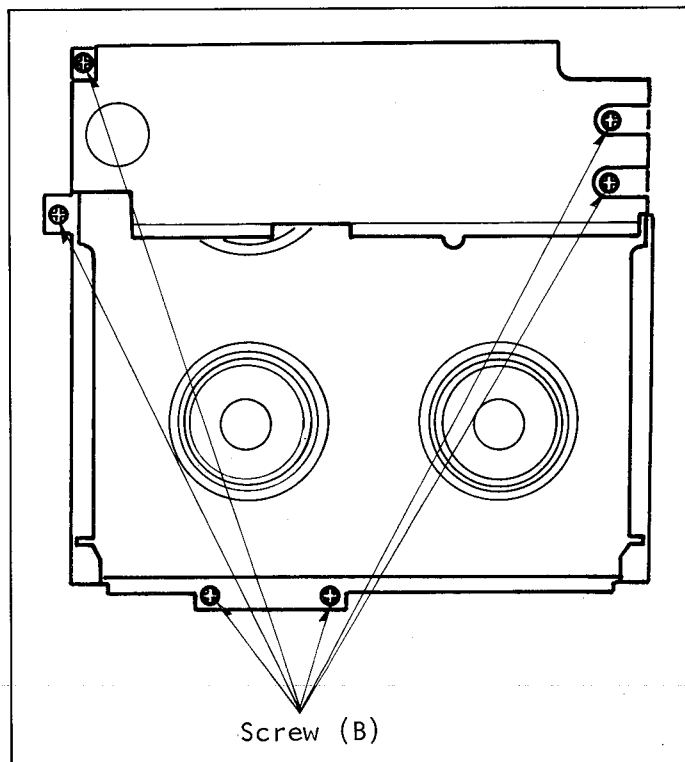


Fig. M4. Removal of the Shield Case

Note:

When reinstalling, ensure that both right and left flaps are placed properly between the diecast chassis and the plastic frame to prevent components surrounding from being damaged.

2-4. Removal of the Cassette Compartment

This item describes easy way to remove entire cassette compartment for servicing or adjustments of parts located under it. Therefore the adjustment is required when re-installing.

1. Turn power on and press the eject button to raise the cassette compartment.
2. Remove 2 screws (C) on each side and remove the cassette compartment.

Note:

When reinstalling, ensure the pin located at left lower portion is engaged with the connecting rod.

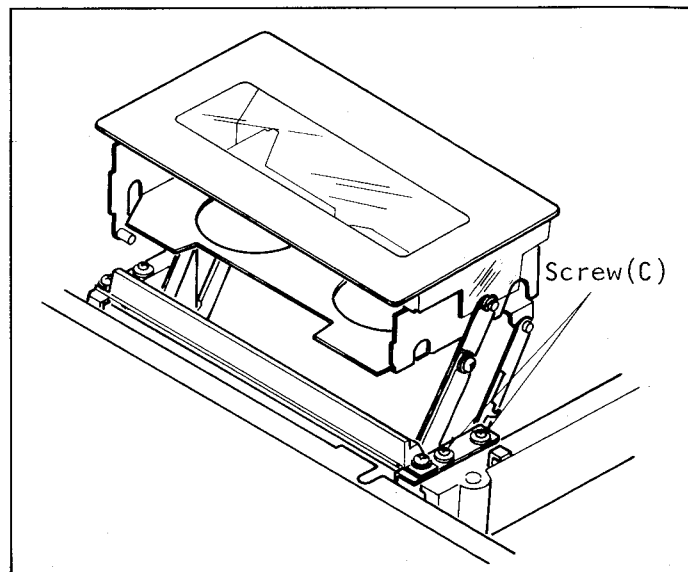


Fig. M5 Removal of the Cassette Compartment - (1)

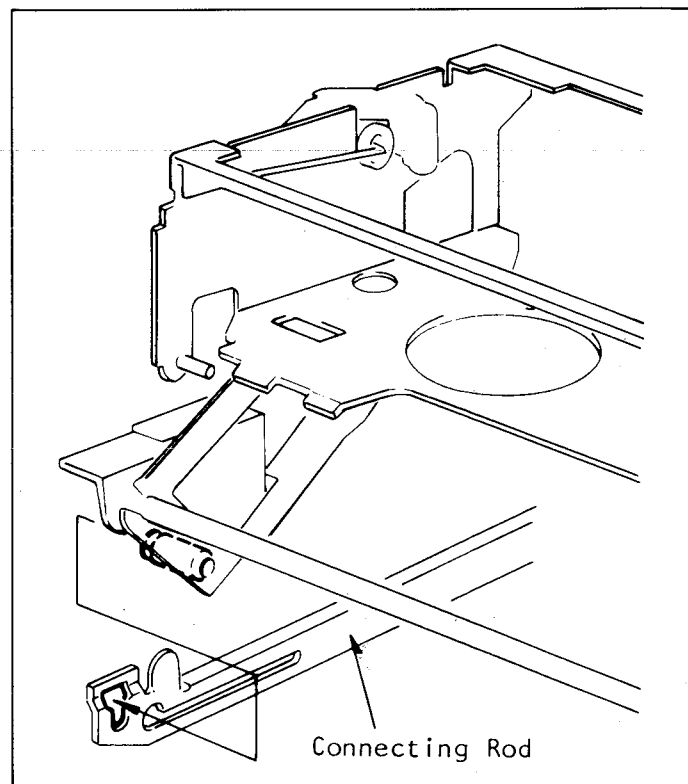


Fig. M6 Removal of the cassette Compartment - (2)

2-4-A. Removal of the Cassette Cover

Turn power on, pressed the eject button to raise the cassette compartment. Remove 2 screws (D) and move the cassette cover upwards to unlock the locking tabs. Then remove the cassette cover.

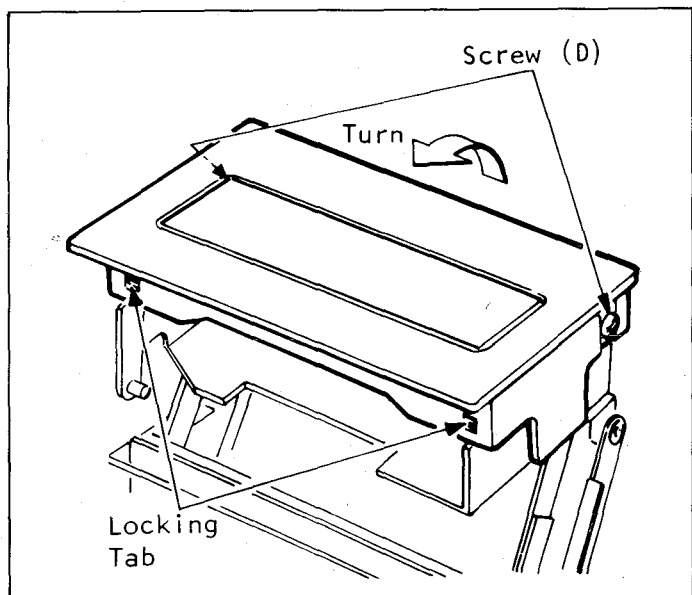


Fig. M7 Removal of the Cassette Cover

Note:

When reinstalling, first fix the locking tabs.

2-4-B. Removal of the Cassette Guide

Remove 2 screws (E) and the Cassette Guide.

Note:

When the guide is individually removed, it should be installed after the cassette up holder is installed because an adjustment is required. When reinstalling, insert the cassette tape and ensure the clearance between tape and projections on the cassette guide is more than 1mm.

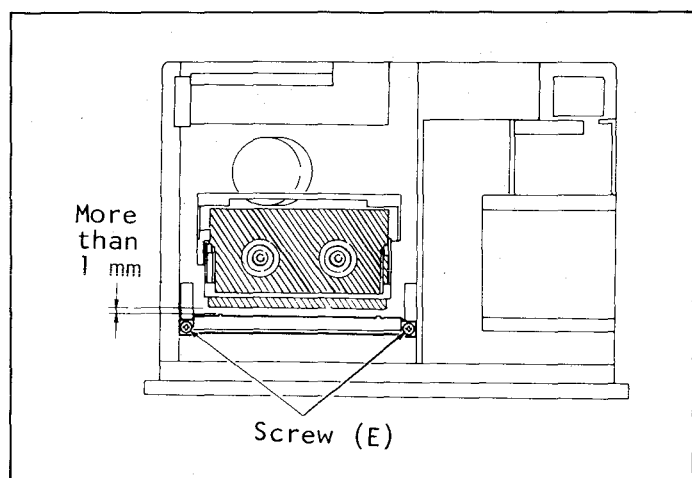


Fig. M8 Removal of the Cassette Guide

2-4-C. Removal of the Cassette Up Holder

Remove 2 screws (F) on each side and the Cassette Holder Unit.

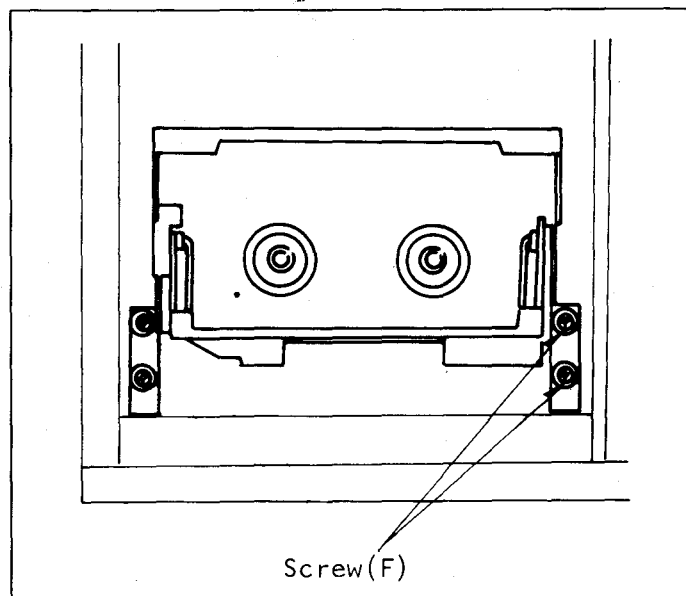


Fig. M9 Removal of the Cassette Holder

2-5. Removal of the Bottom Plate

Note:

Place a pad under the instrument for protection.

Place the instrument on the left side. Remove 5 screws (G) holding the bottom plate. Remove bottom plate.

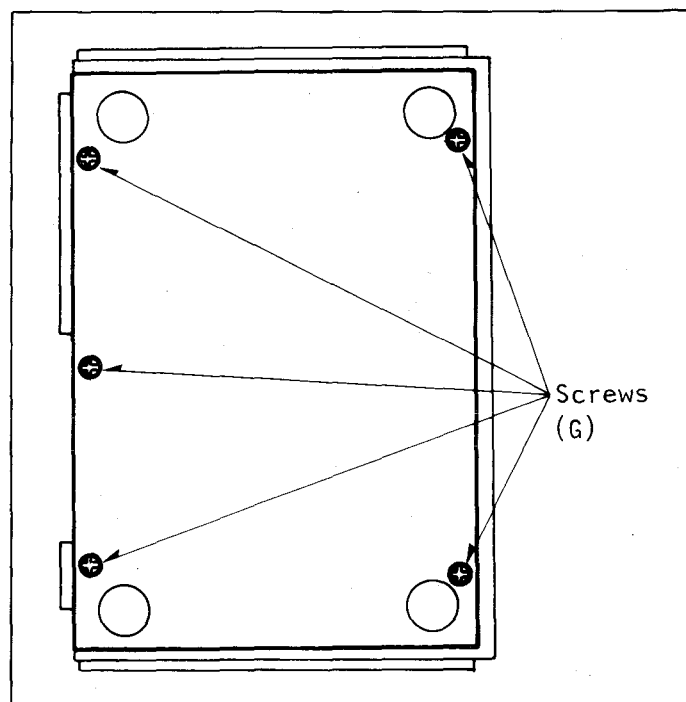


Fig. M10 Removal of the Bottom Plate

2-6. Opening of the Bottom P.C. Board

Remove a red screw (H) and unlock the locking tab. Push the front portion of P.C. Board in the direction indicated to release the knobs and jacks located on the front, then pivot the P.C. Board to open it.

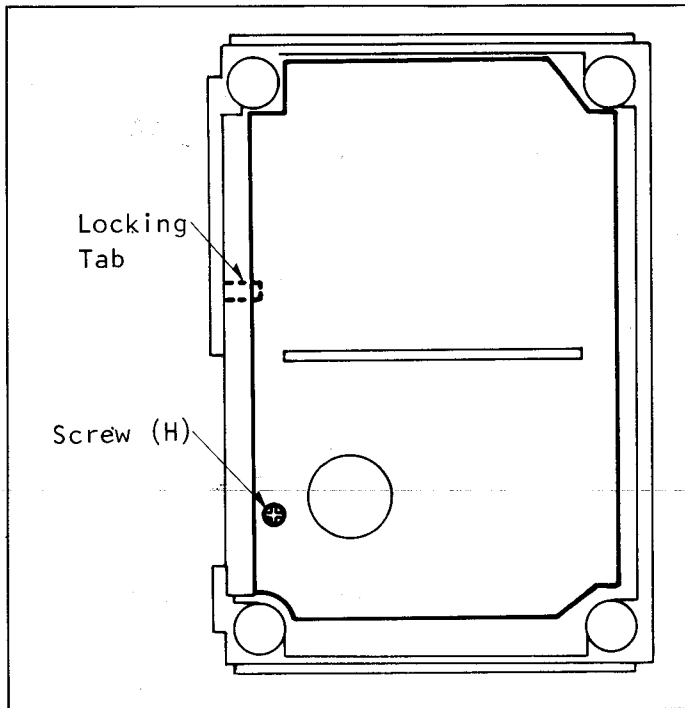


Fig. M11 Opening of the P.C. Board

IMPORTANT SERVICE INFORMATION

If deck is serviced in vertical position with transport side down, the takeup idler may chatter in the play mode. If this occurs, place deck in horizontal position, push play, then return machine to the vertical position.

3. ADJUSTMENT PROCEDURES

1. REPLACEMENT AND ADJUSTMENT OF UPPER CYLINDER UNIT

A. Replacement Procedure

Work with extreme care when removing or replacing the upper cylinder unit. Do not touch video heads during servicing.

1. Remove a screw (A) and Discharge Brush Unit.
2. Unsolder the 8 leads which come up from center shaft and remove 2 screws (B). Then carefully and gently lift the upper cylinder to remove it.

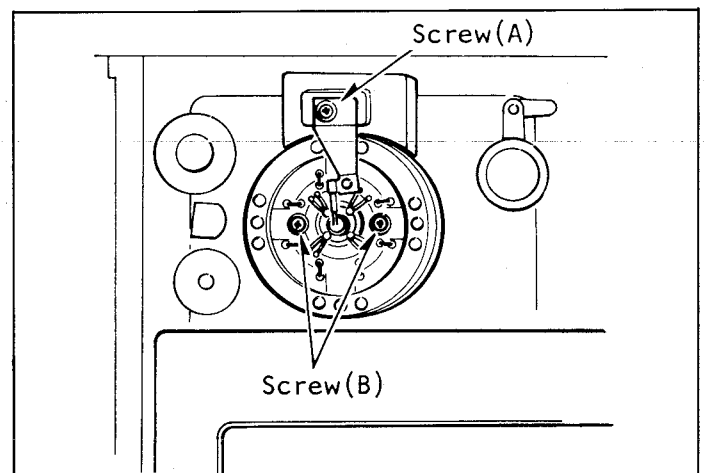


Fig. M12 Removal of Upper Cylinder

3. Before reinstalling new one, clean the DD cylinder shaft and inside of new one with soft cloth moistened with freon solvent.
4. Reinstall the new one so the color codes of 8 leads match leads on the head relay board and tighten 2 screws (B).
5. Resolder the leads and reinstall the Discharge Brush Unit.

B. Adjustment Procedure

Upon completion of replacement, confirm the performance.

The Horizontal Position Adjustment of A/C Head must be performed in the "TAPE INTERCHANGEABILITY ADJUSTMENT" section.

2. REPLACEMENT AND ADJUSTMENT OF DD CYLINDER UNIT

A. Replacement Procedure

Work with extreme care and do not touch video heads during servicing.

1. Disconnect 2 connectors P001 from the Servo P.C.B. and P3008 from Head Amp P.C.B.

Note:

Pay particular attention to how these wires are routed along the chassis so proper lead dress can be restored when the DD Cylinder Unit is reinstalled.

2. Remove 3 screws (A) which mount the DD Cylinder and carefully lift the cylinder out through the top of chassis.

Note:

Since there is very little clearance between DD Cylinder and chassis around of it, use extreme care when removing DD Cylinder to prevent damaging it.

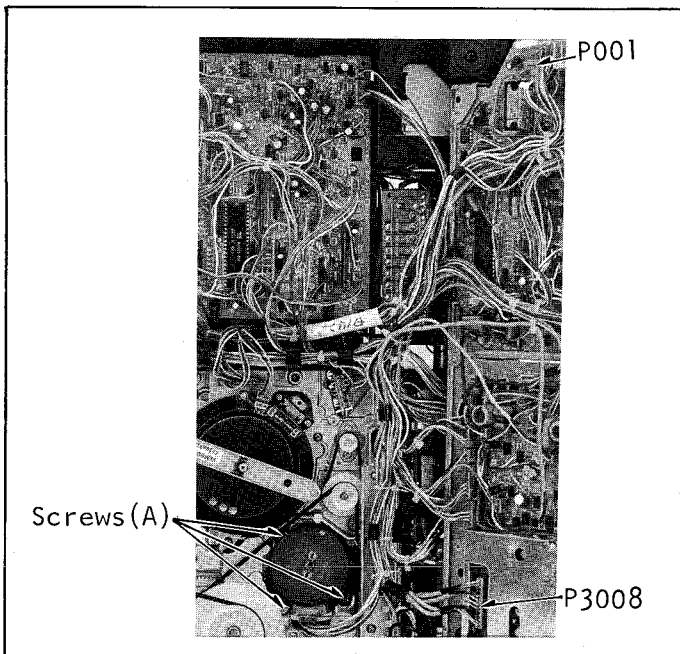


Fig. M13. Removal of D.D. Cylinder

3. Refer to "REPLACEMENT AND ADJUSTMENT OF UPPER CYLINDER UNIT" section. Remove the Upper Cylinder Unit from the DD Cylinder Unit and reinstall it to the new DD Cylinder Unit.
4. Reinstall the new DD Cylinder Unit to the chassis and restore the leads. Ensure that the connectors were connected perfectly.

B. Adjustment Procedure

Upon completion of replacement, confirm the performance.

The items of 16-1, 16-2, 16-3, 16-4, 16-5 and 16-6 must be confirmed or adjusted if necessary.

3. ADJUSTMENT OF V-STOPPERS

* Equipment Required:

V-Stopper Adjustment Fixture

..... VFKS0007

1. Remove the DD Cylinder Unit from chassis. (Upper Cylinder Unit is not required to be removed).
2. Keep 4 screws (A) loose, set the Fixture with two setting pins. Push the V-Stoppers snugly against the pins and tighten the 4 screws (A).

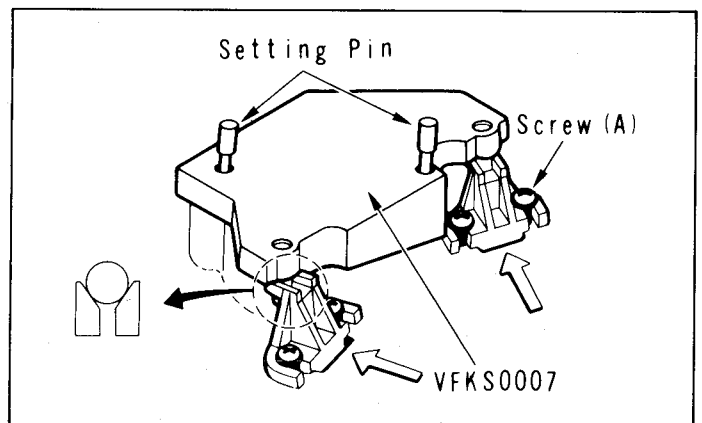


Fig. M14 Adjustment of V-Stoppers

3. Upon completion of the adjustment, simulate loading completion and ensure tht the posts smoothly fit to the V-Stoppers.

4. ADJUSTMENT OF CASSETTE HOLDER

* Equipment Required:
Cassette Holder Fixture ... VFKS0004

Note:

Before adjustment, ensure that the cassette lock lever is unlatched.

1. Remove the Cassette Guide and slightly loosen 4 screws (A). Keep the cassette holder in eject condition.
2. Insert the fixture and push it all the way in until it touches the tabs on the cassette holder. Hold the fixture and cassette holder together with your hand, then slowly lower it while watching all holes and cut-outs until the cassette holder latches.

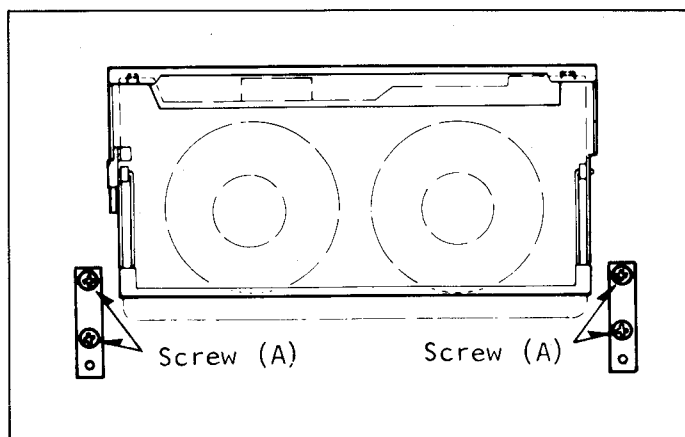


Fig. M15 Adjustment of Cassette Holder

3. Press the center portion of the fixture and adjust the position so as to clear the reels, then tighten the 4 screws (A).
4. Supply power and ensure smooth movement by repeatedly pressing down and ejecting the cassette holder.

5. POSITION ADJUSTMENT OF SAFETY SWITCH

This adjustment is required only when the Safety Switch was replaced or mounting screw were loosened.

* Equipment Required:
Cassette Holder Fixture ... VFKS0004

1. Place the fixture, just slightly loosen 2 screws (A) by about half turn.

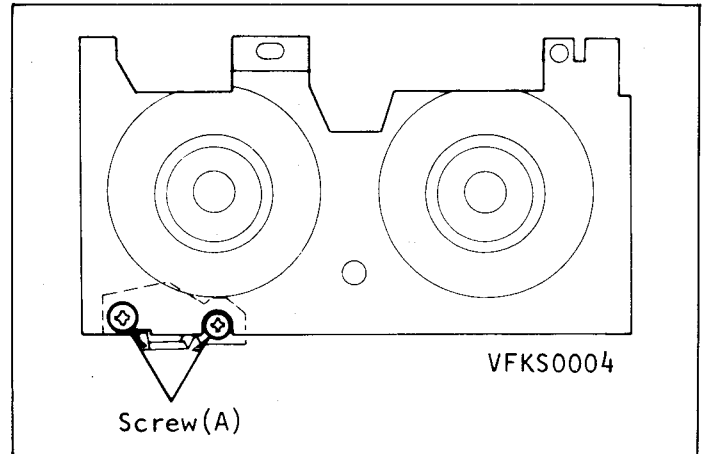


Fig. M16 Position Adjustment of Safety Switch - (1)

2. Turn the switch base counterclockwise and then slowly turn clockwise until switch turns on (it clicks). Tighten 2 screws.

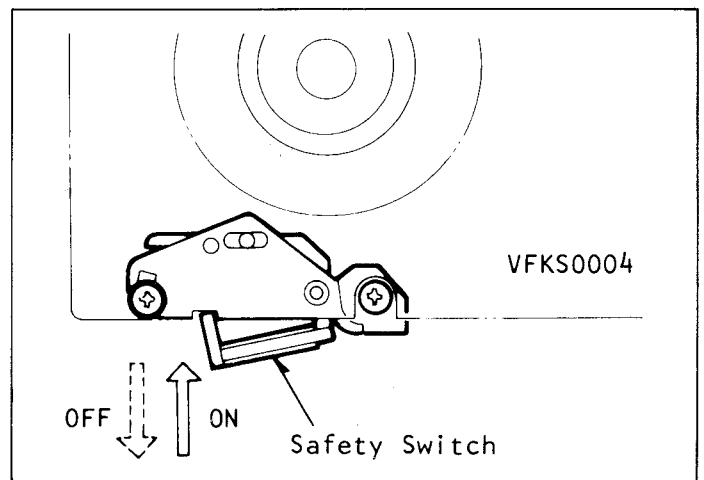


Fig. M17 Position Adjustment of Safety Switch - (2)

3. Upon completion of adjustment, confirm that the safety switch operates by using two cassette tapes (the safety tab of the one is broken and the other is attached).

6. POSITION ADJUSTMENT OF PRESSURE ROLLER

* Specification: $0.5 \pm 0.2\text{mm}$

* Equipment Required:
Long Nose Pliers

..... Purchase locally

1. Cover the phototransistors with masking tape, push the eject lock lever down and push the play button and review button to simulate the Rev mode. As soon as the Rev mode is completed, disconnect the AC plug.

2. Confirm that the clearance between the screw (A) and pressure roller arm is within the specification.

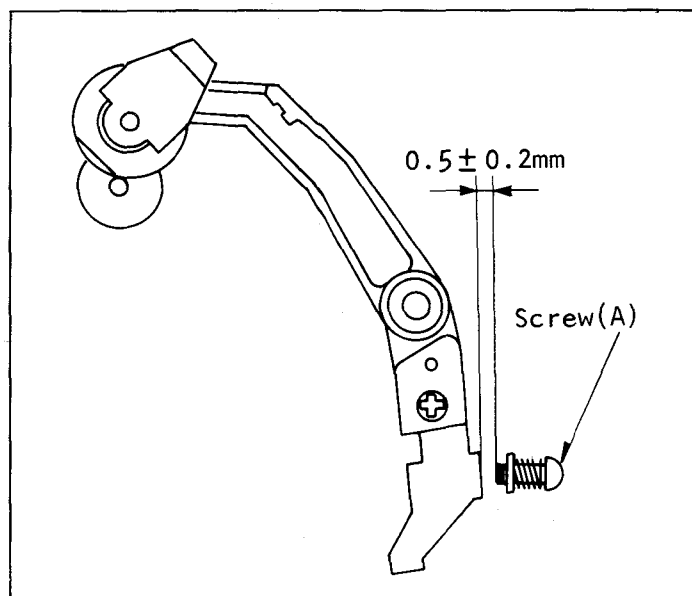


Fig. M18 Position Adjustment of Pressure Roller

3. If it is out of specification, adjust it by turning screw (A) to obtain the specified clearance.

Note:

Feeler gauges can be used to make this measurement.

7. PRESSURE CONFIRMATION OF PRESSURE ROLLER

- * Specification: 1,350 ~ 2,050g
- * Equipment Required:
Fan-Type Tension Gauge VFK66

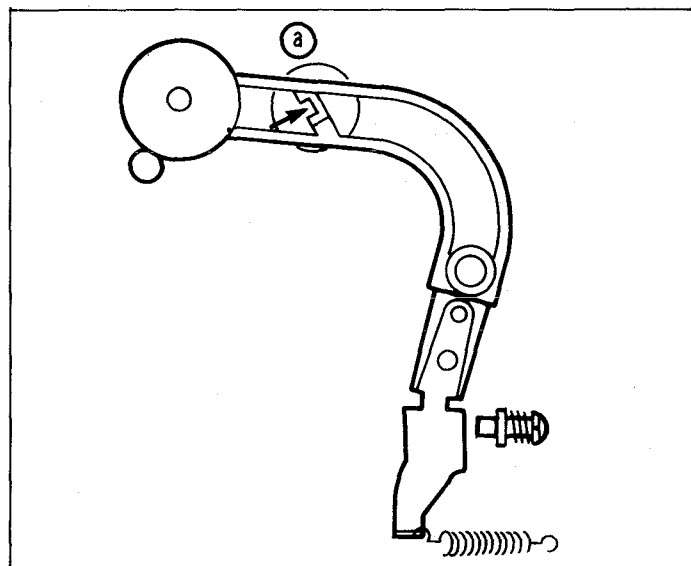


Fig. M19 Confirmation of Pressure Roller

1. Playback the Cassette tape and place the tension gauge to the part (A) of pressure roller lever.
2. Pull on the tension gauge until tape running stops and confirm the read of gauge.
3. If the read on gauge is out of specification, change the spring (A).

8. CONFIRMATION/ADJUSTMENT OF BRAKE TORQUE

A. Confirmation Procedure

- * Equipment Required:
Dial Torque Gauge VFK0133
Adaptor for Gauge VFK0134

	A	B
Takeup	More than 450g·cm	70 ~ 150g·cm
Supply		

Fig. M20 Confirmation of Brake Torque - (1)

1. Attach the adaptor to the torque gauge. And place the deck so that the left side faces down, and open the P.C. Board.

(This section continues on page 2-8)

(Continued from before page.)

2. First, turn the main pulley counter-clockwise until the FF/REW mode. Next, the main brakes just touch the reel tables by turning the main pulley clockwise. Then confirm each main brake arm just touches each reel table.

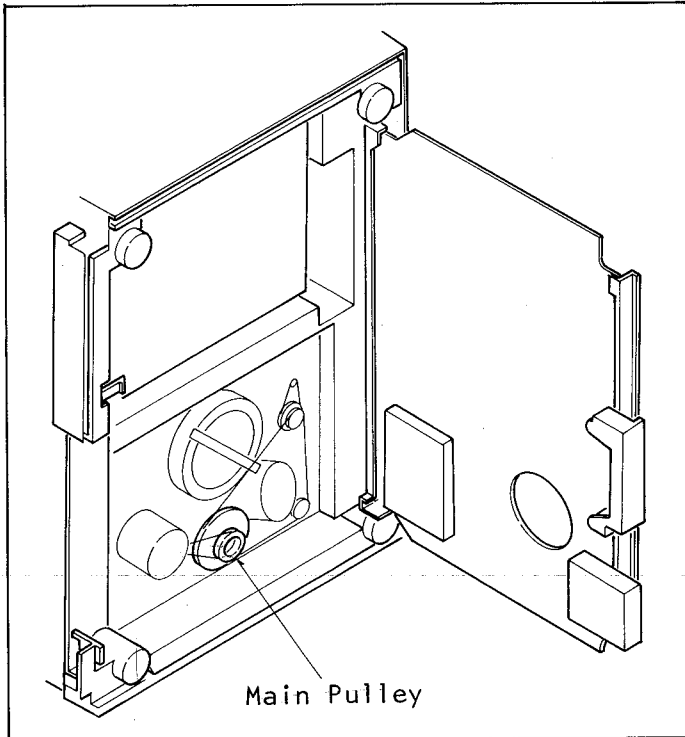


Fig. M21 Confirmation of Brake Torque - (2)

3. Place the torque gauge on the reel table. The weight of gauge should not rest on the reel table.

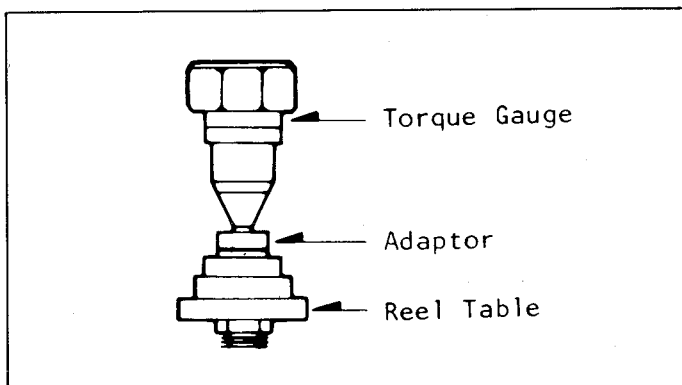


Fig. M22 Confirmation of Brake Torque - (3)

4. Turn torque gauge in either direction indicated in the Fig. M20 and read the gauge when the brake begins slipping.

B. Adjustment Procedure

To adjust the brake torque, change the notch setting of the spring. The spring tension increases by setting on the outer notch and decreases on inner notch used. (Fig. M23)

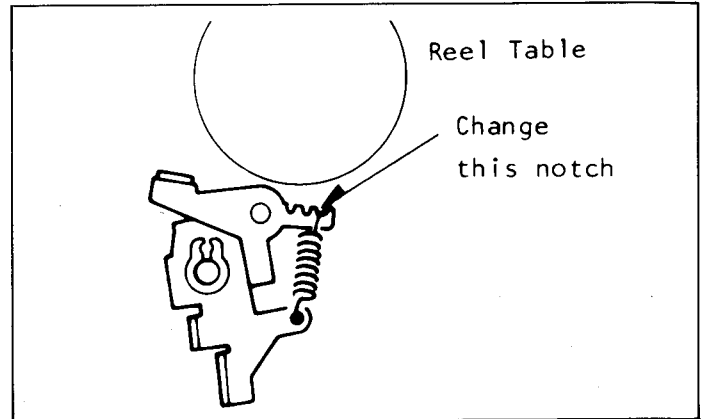


Fig. M23 Adjustment of Brake Torque

Note:

If proper brake torque can not be obtained by changing the spring position, clean the rotating surface of the reel table with a soft cloth and recheck torque before replacing brake drum.

9. CONFIRMATION OF TAKE-UP TORQUE

* Equipment Required:

Dial Torque Gauge VFK0133
Adaptor for Gauge VFK0134

* Specifications:

in PLAY mode 105 ~ 125g.cm
in FF mode and in REWIND mode
..... more than 350g.cm

1. Attach the adaptor to the torque gauge.
2. Cover the take-up and supply photo-transistors, with black tape. Lower the cassette up holder (without cassette cover), and turn power switch on.
3. Place the torque gauge on the take-up reel table, push the play button and read torque on the gauge. This also work for FF mode by pushing the FF button.

Note:

While measuring, the weight of the gauge should not rest on the reel table.

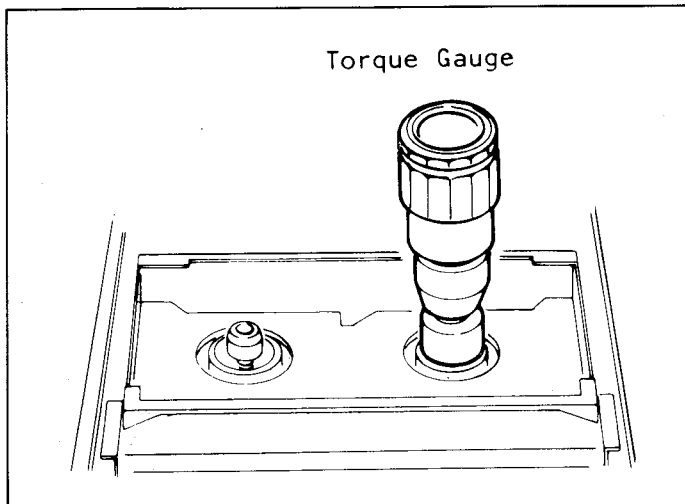


Fig. M24 Confirmation of Takeup Torque

4. Set the torque gauge to the supply reel table, press the rewind button to check rewind mode torque.

10. ADJUSTMENT OF PLAY TORQUE

- * Equipment Required:
Digital Volt Meter
Voltage Range: 0.001 ~ 50V
Dial Torque Gauge VFK0133
Adaptor for Gauge VFK0144
- * Specification: 165 ~ 175mV
- 1. Connect the DVM to TP4408(Hot) and TP4407(Gnd) on the Audio(II) & Dolby P.C.Board.

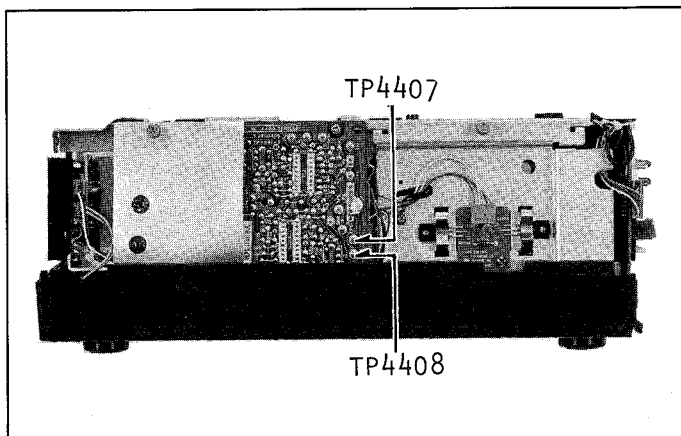


Fig. M25. Adjustment of Play Torque - (1)

2. Adjust the R6180 on the System Control P.C. Board so that the voltage range is 165 ~ 175mV.
3. Upon completion adjustment, confirm the play torque by dial torque gauge. Refer to "CONFIRMATION OF TAKE-UP TORQUE" section.

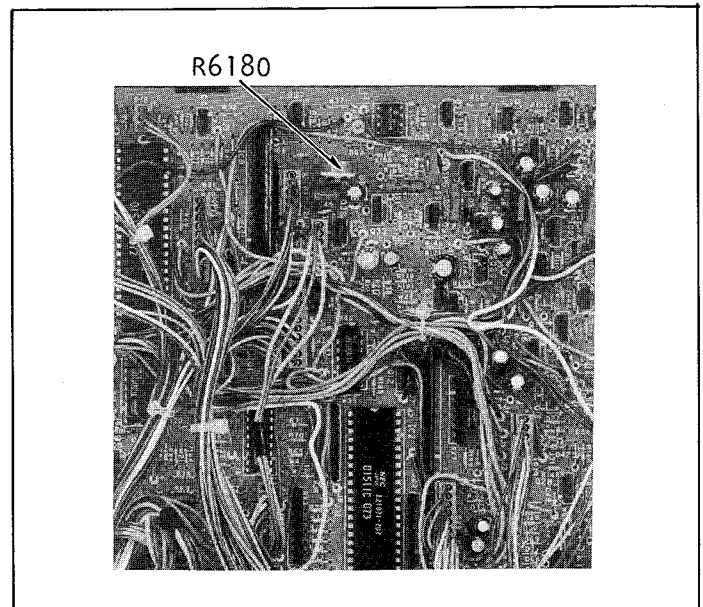


Fig. M26. Adjustment of Play Torque - (2)

11. POSITION ADJUSTMENT OF TENSION POST

- * Equipment Required:
Tension Post Adjustment Plate VFKS0002
Fine Adjustment Screwdriver VFKS0021
- 1. Cover the supply phototransistor with black tape and press the cassette lock lever down to simulate the condition when a cassette is lowered.

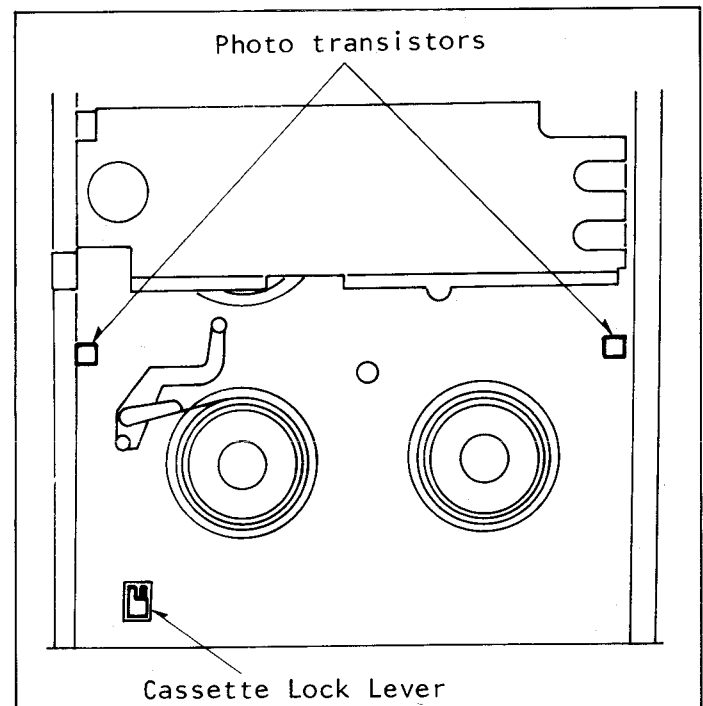


Fig. M27 Position Adjustment of Tension Post - (1)

2. Turn power switch on and push the play button for loading. As soon as the loading is completed, disconnect the AC plug.
3. Place the adjustment plate over the reels and slightly loosen the screw securing the tension band bracket.
4. Insert the fine adjustment screwdriver into the hole and move the tension band bracket in either direction so that the tension post just touches the fixture. The tension post removes from the fixture by turning counterclockwise the fine adjustment screwdriver. Then turn it clockwise until the tension post touches the fixture.

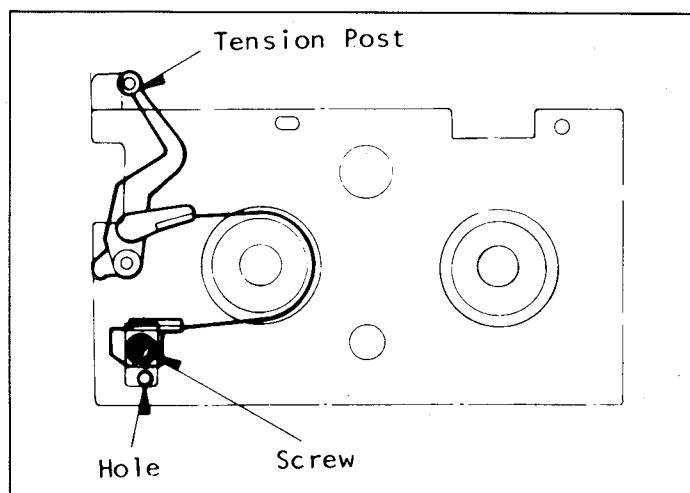


Fig. M28 Position Adjustment of Tension Post - (2)

5. Upon completion of adjustment, confirm the gap between the tension release pin and main rod. This gap is more than 1mm.

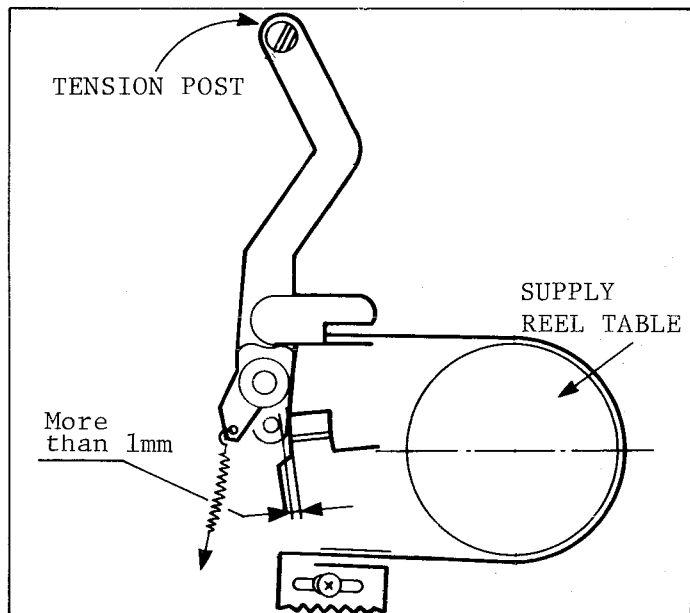


Fig. M29. Position Adjustment of Tension Post - (3)

12. MEASUREMENT/ADJUSTMENT OF BACK TENSION

A. Measurement Procedure

- * Equipment Required:
Back Tension Meter
Tentelometer, Model T2-H7-UM
VHS Cassette Tape
120 Minutes Tape
- * Specifications: 25 ~ 30g
- 1. Pull the erase head in the direction indicated by the arrow and secure it with masking tape.
- 2. Playback the cassette tape (120 minutes tape) from its beginning and wait until tape running has stabilized. (for approx. 10 to 20sec)
- 3. Insert tension meter in tape path and confirm reading of tension meter.

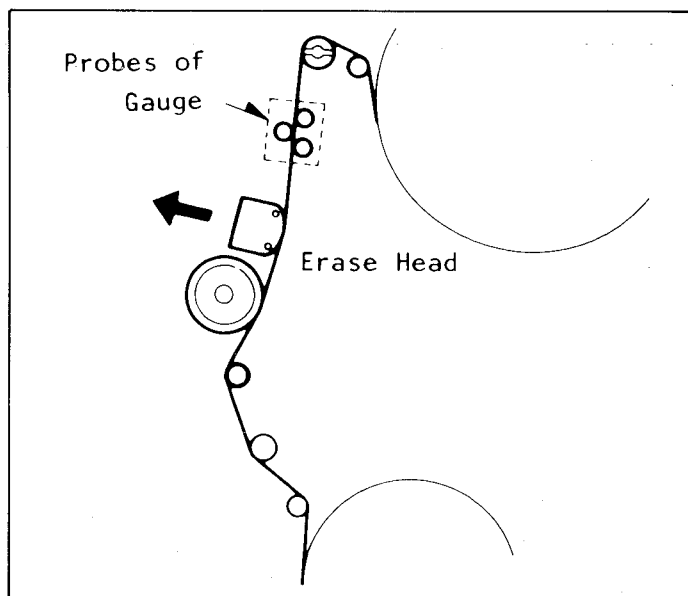


Fig. M30 Measurement of Back Tension

Notes:

1. Make sure that the three probes of the meter are all in good contact with the tape, and that you are not touching anything.
2. It is recommended to measure about three times as the tension meter is very sensitive.

B. Adjustment Procedure

* Equipment Required:

Fine Adjustment Screwdriver

..... VFK0136

1. Loosen screw (A) and insert the fine adjustment screwdriver into the hole (B).
2. Move the adjustment plate in either of direction as indicated by the arrow to obtain the specified tension. Turn the driver clockwise to raise tension, counterclockwise to lower it.
3. Tighten the screw (A) and verify tension with the meter once again.

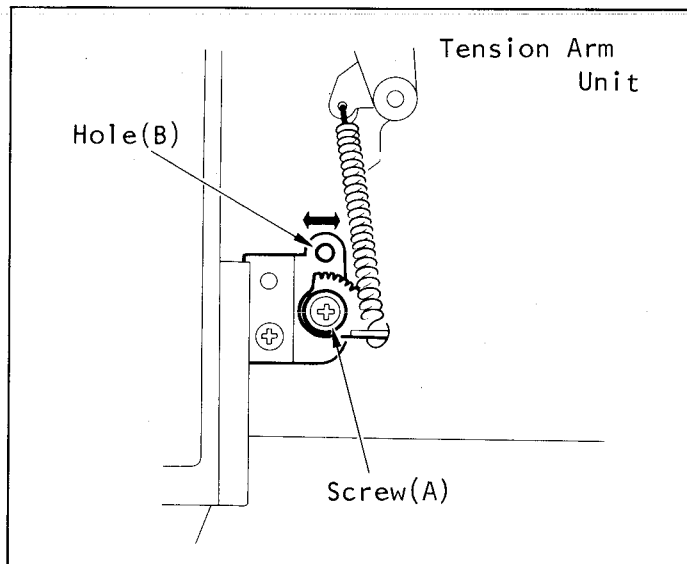


Fig. M31 Adjustment of Back Tension

Note:

Upon completion of adjustment, remove the masking tape that holding the erase head.

13. HEIGHT ADJUSTMENT OF REEL TABLES

* Equipment Required:

Post Adjustment Plate VFKS0010

Reel Table Height Gauge ... VFKS0009

* Specification: $0.1 \pm 0.1\text{mm}$

Cut-out surface of VFKS0010 is reference of height of reel tables and their height are measured based on this reference.

1. Place the post adjustment plate over the reels, and put the gauge on it. Set the gauge to zero "0" with the condition that the foot scraper of the gauge touches the cut-out portion of the plate.

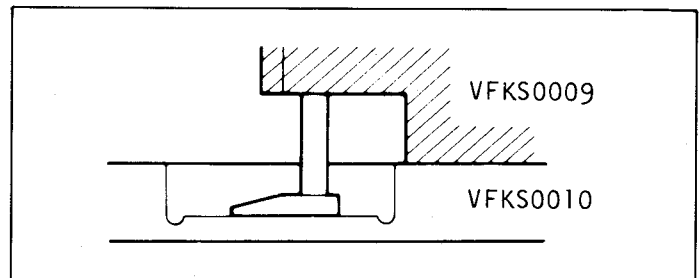


Fig. M32 Height Adjustment of Reel Tables - (1)

2. Then measure the top portion of reel table and confirm the difference against the condition just performed in former step.
Do same for the other reel table.

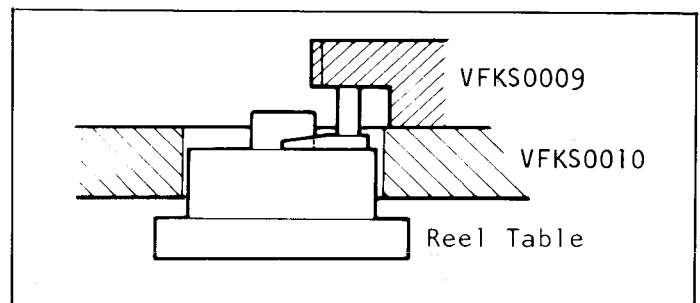


Fig. M33 Height Adjustment of Reel Tables - (2)

3. If the difference of reading of gauge between height at cut-out portion of VFKS0010 (See Fig. M32) and the height of reel tables (See Fig. M33) is more than 0.1mm (higher or lower), adjust the height of reel table to obtain the specified height.
4. For adjustment, change the poly slider washer located under the reel table. (The washer is available in three sizes of thickness, $t = 0.13\text{mm}$, 0.25mm and 0.5mm .)

14. HEIGHT ADJUSTMENT OF TAPE GUIDE POSTS

* Equipment Required:

Hex. Wrench (0.9mm) VFK0146

Post Adjustment Plate VFKS0010

Reel Table Height Gauge ... VFKS0009

Nut Driver (5.5mm)

..... Purchase Locally

Post Adjustment Screwdriver

..... VFK0137

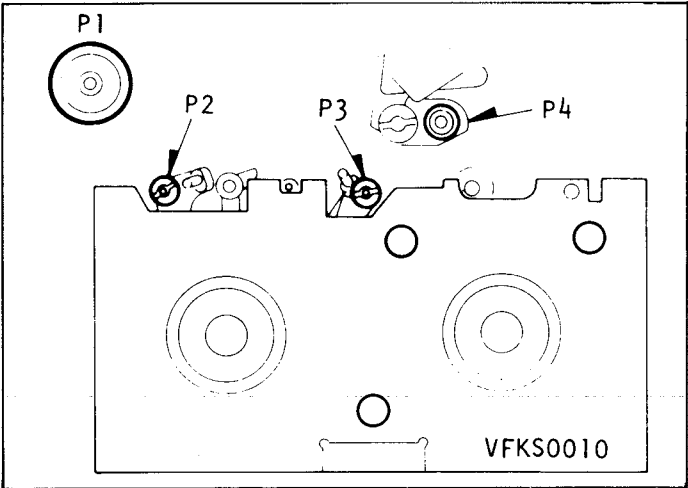


Fig. M34 Height Adjustment of
Tape Guide Posts - (1)

1. Install the adjustment plate and lower all posts so that the condition is as shown. (Lower end of post, tape guide, should be lower than foot of gauge.) Loosen a hex. screw locted on the lower portion of posts (P2 & P3) then turn the top of the post with post adjustment screwdriver.

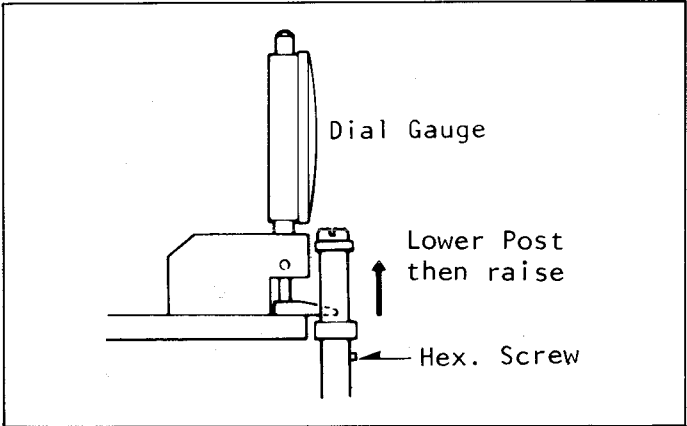


Fig. M35 Height Adjustment of
Tape Guide Posts - (2)

2. Place the dial gauge on the adjustment plate and fit the foot of gauge to the post. The condition to fit the foot should be as shown. (The foot of gauge should be fully lowered till it touches the plate).

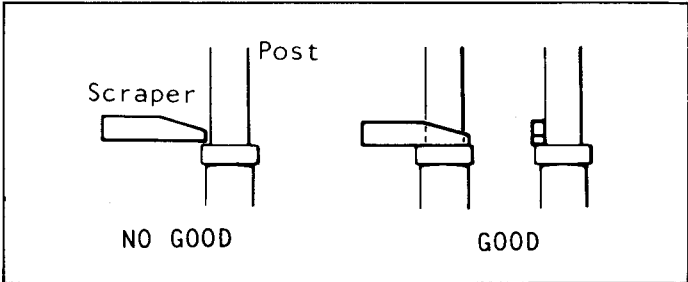


Fig. M36 Height Adjustment of
Tape Guide Posts - (3)

3. Set the dial gauge to zero "0" and slowly raise the post until it just touches the foot of gauge. For adjustment of P1 and P4, use the nut driver.
(The post cap on P4 can be removed by turning counterclockwise.)
For adjustment of P2 and P3, use the post adjustment screwdriver.

Note:

Upon completion of adjustment, tighten hex. screws on P2 and P3 and install the post cap on P4. When the post cap on P4 is reinstalled, the direction of it should be as shown below viewing from the direction indicated by the arrow.

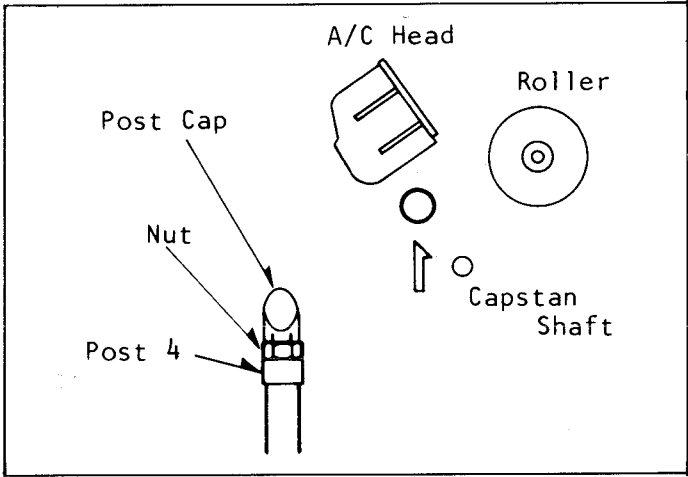


Fig. M37 Height Adjustment of
Tape Guide Posts - (4)

15. HEIGHT ADJUSTMENT OF PULL OUT POST

Notes:

1. The adjustment should be performed after the adjustment of P4 as the spec is based on height of P4.
2. The adjustment should be performed in the loading completion mode.
3. Unless the replacement or adjustment of this post is completed, remove the AC plug.

* Equipment Required:

Post Adjustment Plate VFKS0010
 Reel Table Height Fixture

..... VFKS0009
 Nut Driver (5.5mm)

..... Purchase Locally

- * Specification: $0.02 \pm 0.02\text{mm}$

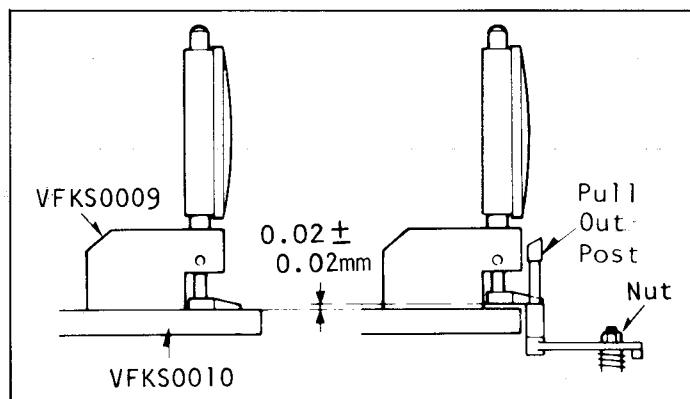


Fig. M38 Height Adjustment of Pull Out Post - (1)

1. Turn power switch on, press the cassette lock lever down, cover the take-up and supply phototransistors with black tape and push the play button for loading.
2. As soon as loading is completed, disconnect the AC plug.
3. Place the adjustment plate, put the height fixture on the plate and set dial gauge to zero "0" with condition the scraper touches on the plate.

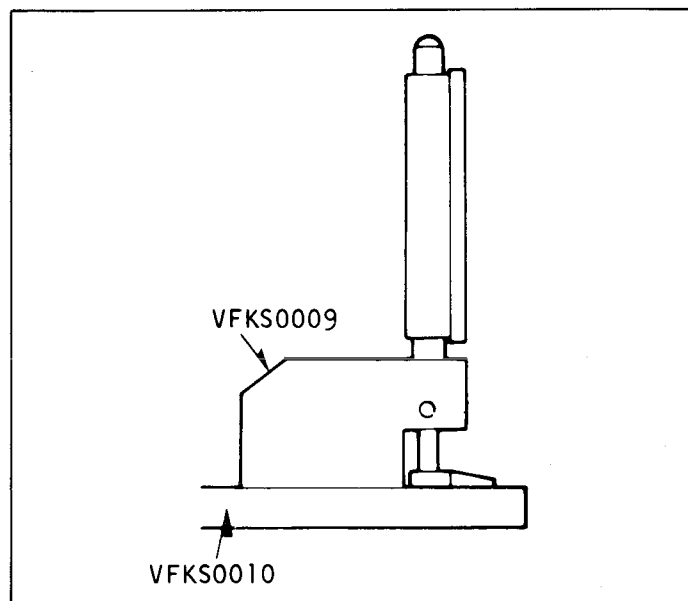


Fig. M39 Height Adjustment of Pull Out Post - (2)

4. First, slightly lower the post by turning the nut clockwise. Fit the scraper to the post so that the condition becomes as shown.

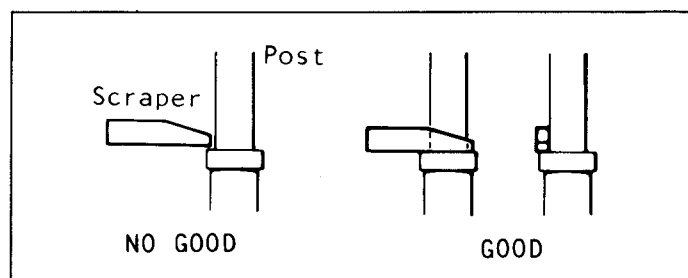


Fig. M40 Height Adjustment of Pull Out Post - (3)

5. Then slowly and slightly turn the nut till the gauge reads specified height.

16. TAPE INTERCHANGEABILITY ADJUSTMENT

Note:

To perform these adjustment/confirmation procedures, make sure that the tracking control is set into the detent (fixed) position.

* Equipment Required:

Alignment Tape VFMS0001H6
 Post Adjustment Screwdriver VFK0137
 H-Position Adjustment Screwdriver VFKS0003
 Hex. Wrench (0.9mm) VFK0146
 Hex. Wrench (1.5mm) VFK76
 Oscilloscope
 Nut Driver (7mm)

Purchase Locally

16-1. Confirmation of Tape Travel

To prevent the alignment tape from being damaged, use a normal cassette tape for this procedure.

1. Playback a cassette tape and confirm that the tape travels without curling at the edges of the tape.

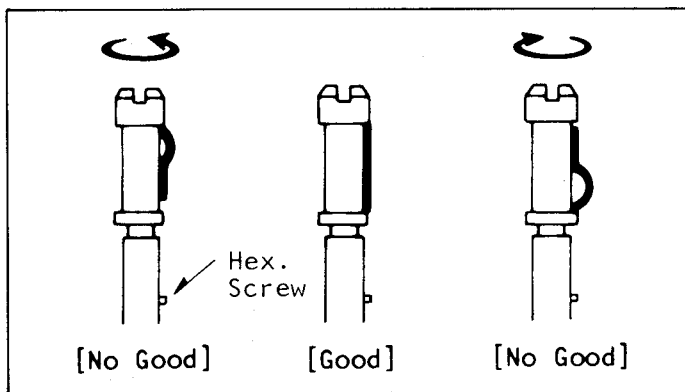


Fig. M41 Confirmation of Tape Travel

2. If curling is apparent, adjust the height of posts by turning the top of post with the post adjustment screwdriver (for 2 & P3) or with the nut driver (for P1 & P4).

Note:

Before turning P2 and P3, slightly loosen a hex. screw.

16-2. Confirmation of A/C Head Height

Note:

Unless the A/C Head is replaced, this procedure should not be performed.

Looking at the lower edge of the control head with the tape running, ensure the lower edge of tape runs along the lower edge of the control head.

If it doesn't, just slightly turn the nut (A) in either directions to correct to lower the head and counterclockwise to raise it.

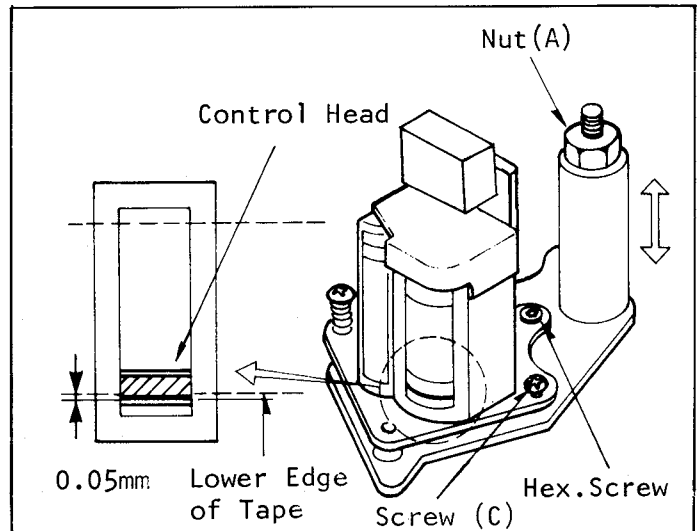


Fig. M42. Confirmation of A/C Head Height

16-3. Confirmation of Tilt of A/C Head

Note:

Unless the Post-4 is preadjusted, this procedure should not be performed.

Playback the tape and confirm the tape runs between lower and top limiters of the post. If the lower edge or top edge of the tape turns with waving or frilling, then correct the tilt of the A/C head by turning a hex. screw.

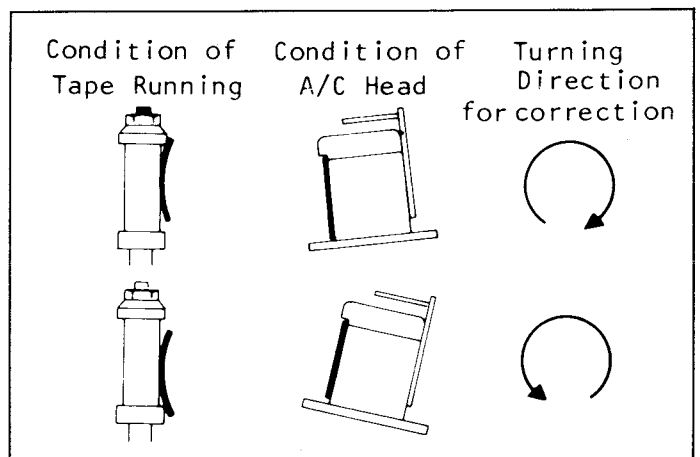


Fig. M43 Confirmation of Tilt of A/C Head

16-4. Adjustment of A/C Head Height and Azimuth

1. Playback the Color-Bar portion (3kHz, Stereo) of the alignment tape (VFMS0001H6).

Connect the oscilloscope CH1 to the Audio Output (Left) and CH2 to the Audio Output (Right) on the rear panel.

Then adjust the screw (C) so that the CH2 envelope is maximum.

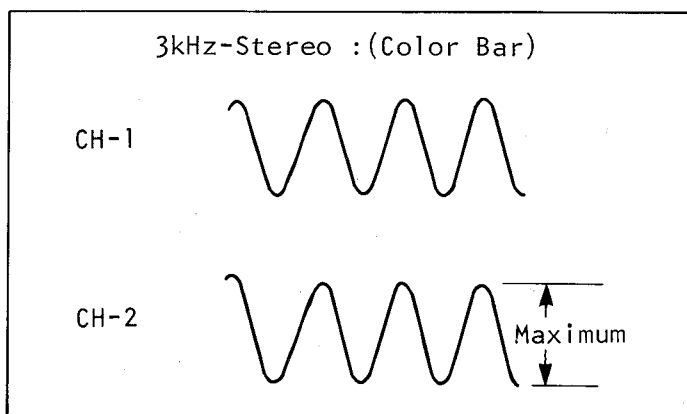


Fig. M44. Adjustment of A/C Head Height and Azimuth - (1)

2. Playback the Color-Bar portion (3kHz, Stereo) of the alignment tape (VFMS0001H6).

Connect the oscilloscope CH1 to the Audio Output (Left) and CH2 to the Audio Output (Right) on the rear panel.

Then adjust the nut (A) so that the CH2 envelope is maximum.

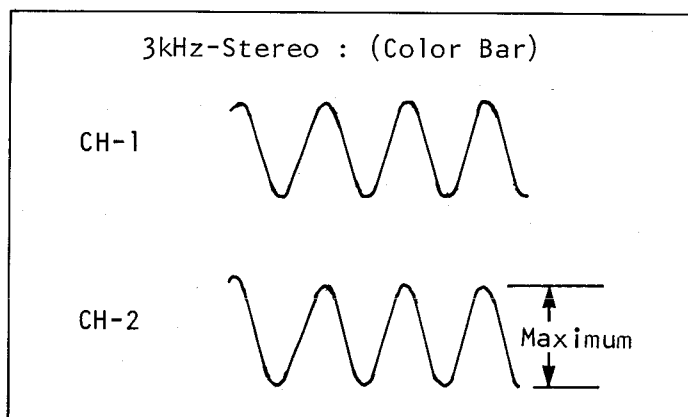


Fig. M45. Adjustment of A/C Head Height and Azimuth - (2)

3. Playback the Monoscope portion (6kHz, Monaurul) of the alignment tape (VFMS0001H6).

Connect the oscilloscope CH1 to the Audio Output (Left) and CH2 to the Audio Output (Right) on the rear panel.

Then adjust the screw (C) so that the phases of the both channels are matched as shown below.

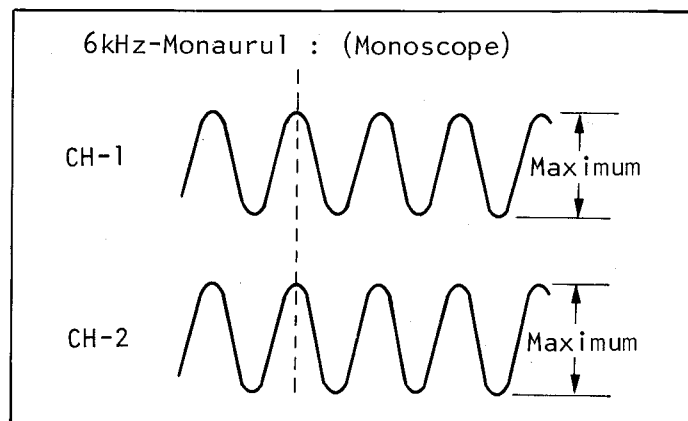


Fig. M46. Adjustment of A/C Head Height and Azimuth - (3)

Note:

During this adjustment, the audio output level should be maximum.

16-5. Horizontal Position Adjustment of A/C Head

1. Set the tracking control to the de-tent (fixed) position. Connect the oscilloscope to the Test Point (TP3016).
2. Playback the monoscope portion of the alignment tape VFMS0001H6 and confirm the envelope figure.
3. If adjustment is required, set the H-position adjustment screwdriver into the slot of the adjustment nut and rotate in either direction to obtain maximum envelope output.

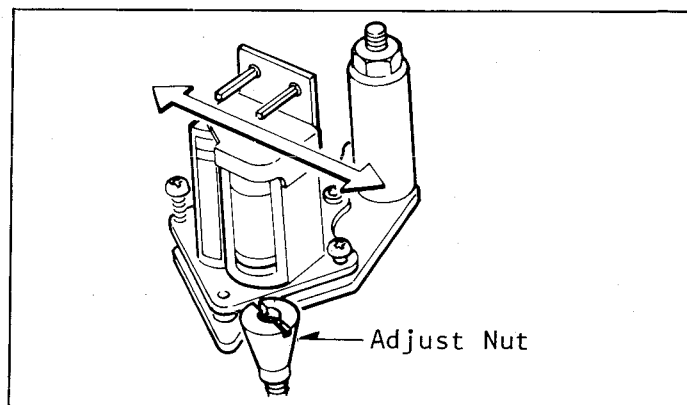


Fig. M47. Horizontal Position Adjustment of A/C Head

16-6. Confirmation/Adjustment of Envelope Output

1. Set the tracking control in the de-tent (fixed) position. Connect the oscilloscope to Test Point (TP3016).
2. Playback the monoscope portion of the alignment tape VFMS0001H6, adjust posts P2 and P3 while watching the scope display (Envelope of TP3016 on Main P.C. Board) so that the RF envelope on the scope becomes as flat as possible.

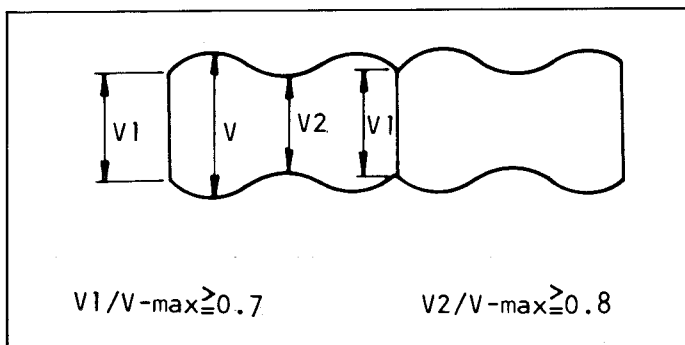


Fig. M48 Confirmation of Envelope Output

Note:

See Fig. M34 for location of P1, P2, P3 and P4.

3. If the scope display is as follows, adjust the height of P2 shown in Fig. M34.

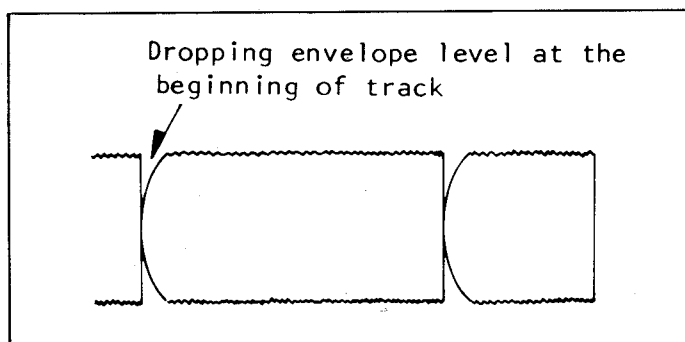


Fig. M49 Adjustment of Envelope Output - (1)

4. If the scope display is as follows, adjust the height of P3 shown in Fig. M34.

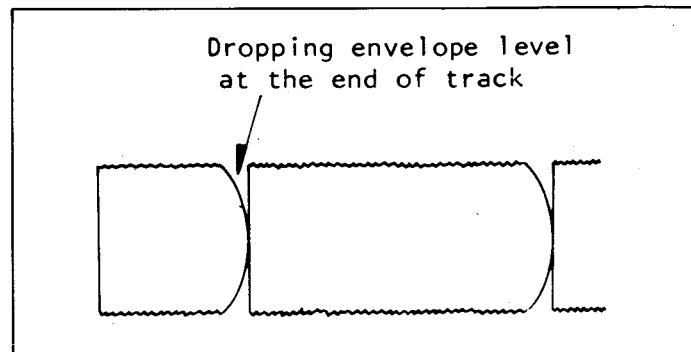


Fig. M50 Adjustment of Envelope Output - (2)

5. The scope display with P2 and P3 adjusted correctly should be as shown below.

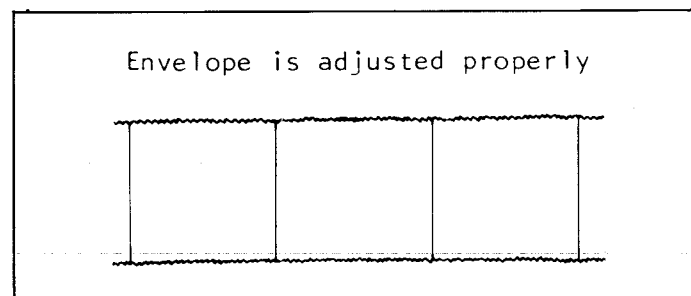


Fig. M51 Adjustment of Envelope Output - (3)

6. When adjustment is required, turn slowly and wait for servo lock. Be sure the tape travels over the post as shown.

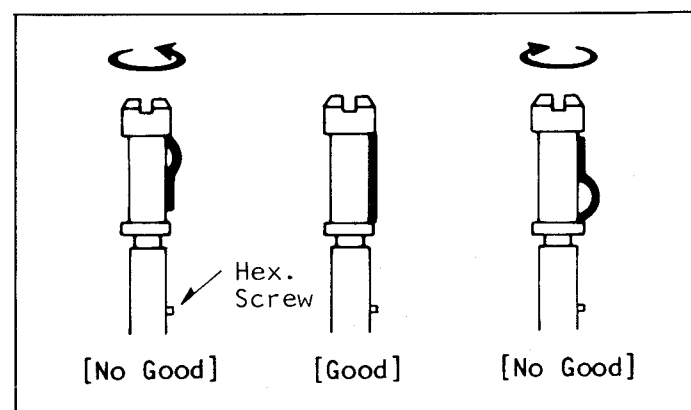


Fig. M52 Adjustment of Envelope Output - (4)

17. ADJUSTMENT OF CAM GEAR AND MODE SELECT SWITCH

General:

The mechanism of this model is interconnected with the electrical circuit, (System Control Circuit), mainly through the mode select switch. The relation between the mode switch and the cam gear decides all further mechanical movement of the mechanical parts such as levers, gears, rollers etc.

If this is misadjusted, the deck will be unloaded. This may result in damage to both mechanical and electrical parts.

Note:

This procedure describes the assembly and adjustment method. For the disassembly method please refer to this flowchart.

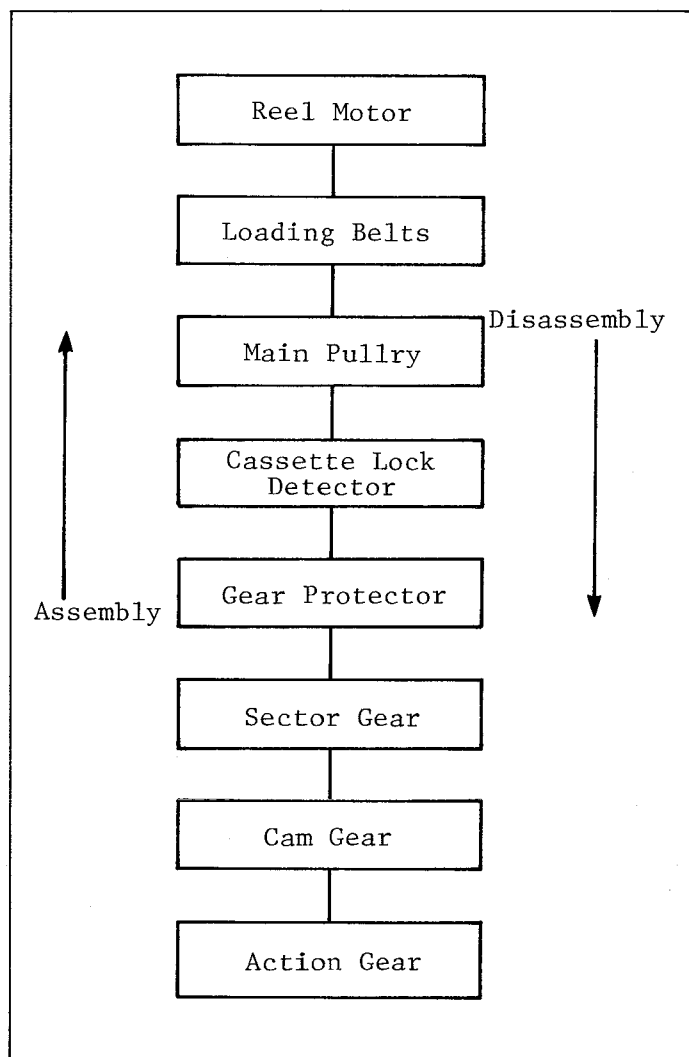


Fig. M53 Adjustment of Cam Gear and
Mode Select Switch - (1)

Adjustment Procedures:

1. Install the action gear so that the hole on the action gear aligns with the projection on the loading gear. Ensure that the loading gear is still in the fully unloaded condition.

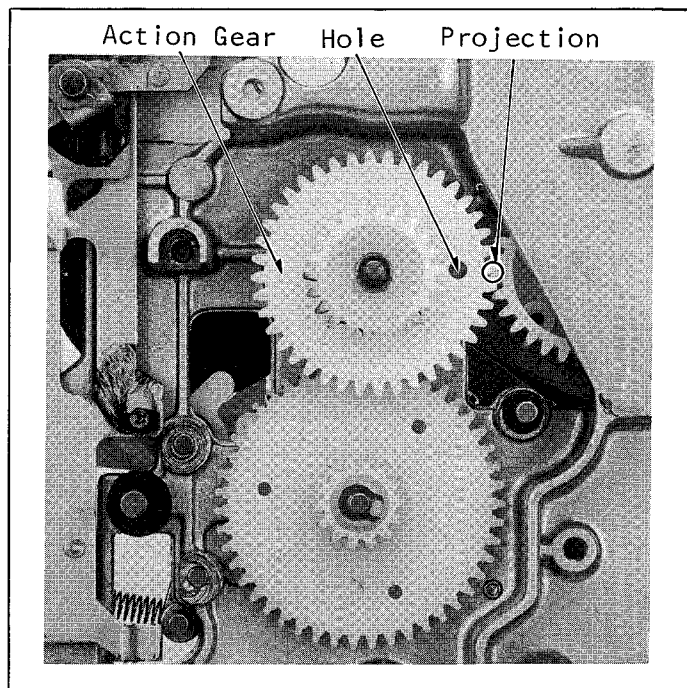


Fig. M54. Adjustment of Cam Gear and
Mode Select Switch - (2)

2. Slowly slide the main rod so that the V-shaped mark on it meets the V-shaped mark of the mode select switch. This will simulate the stop mode (Unloading completion) of the main rod and mode select switch. See "A" in Fig. M55.
3. Insert the cam gear so that the hole on the gear meets the hole on the main rod. See "B" in Fig. M55. To match the two holes either, use the small hex. wrench (VFK75) or a metal pin. Also ensure that the two V-shaped marks are aligned and that the simpler slotted side of the cam gear is visible.
4. Install the sector gear so that the pin on the sector gear aligns with the inner slot of the cam gear (simpler slotted side). Install 2 retaining rings to hold the cam gear and sector gear, then install the spring.

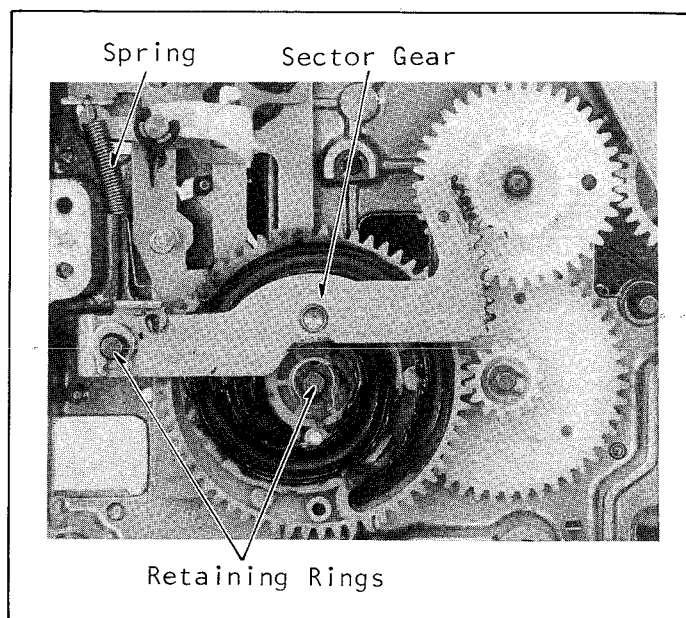


Fig. M56. Adjustment of Cam Gear and Mode Select Switch - (4)

5. As described before the two V-shaped marks on the mode select switch should be aligned. As this time the mechanical portion should look like Fig. M57.

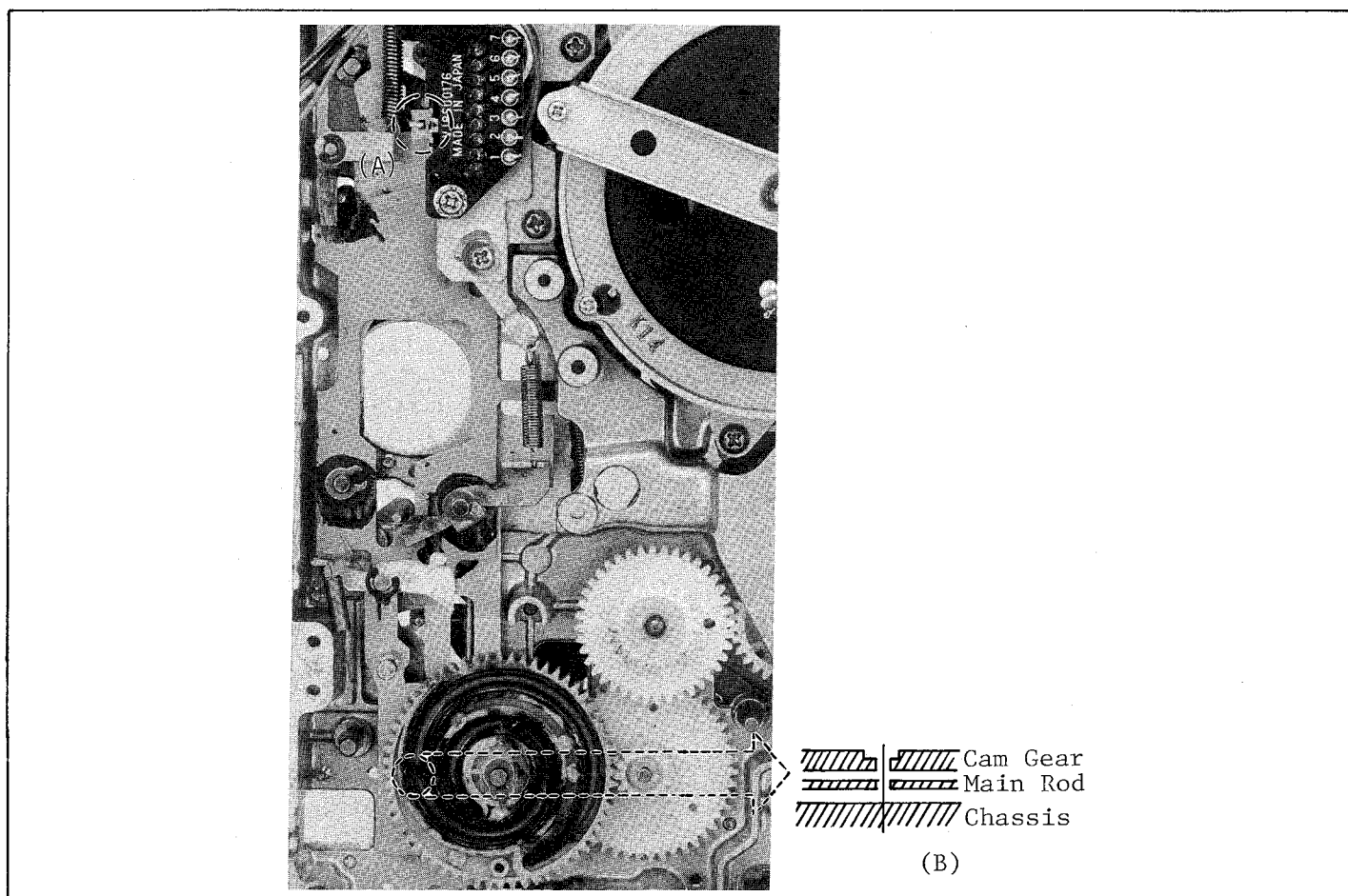


Fig. M55. Adjustment of Cam Gear and Mode Select Switch - (3)

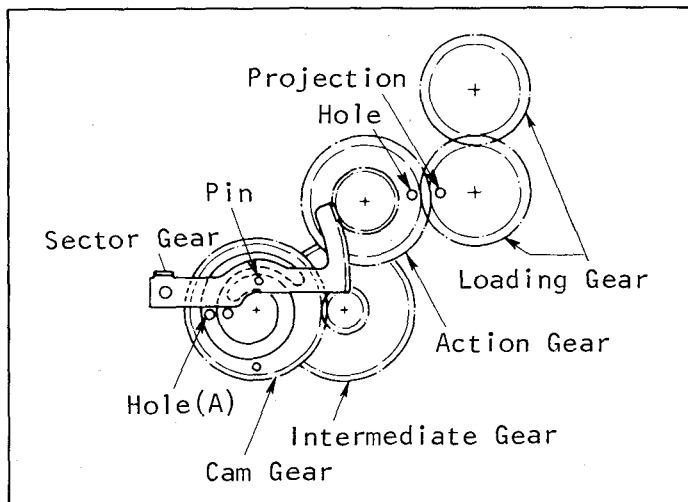


Fig. M57 Adjustment of Cam Gear and Mode Select Switch - (5)

6. Install the gear protector and tighten the nut for mounting it and install the "E" ring.

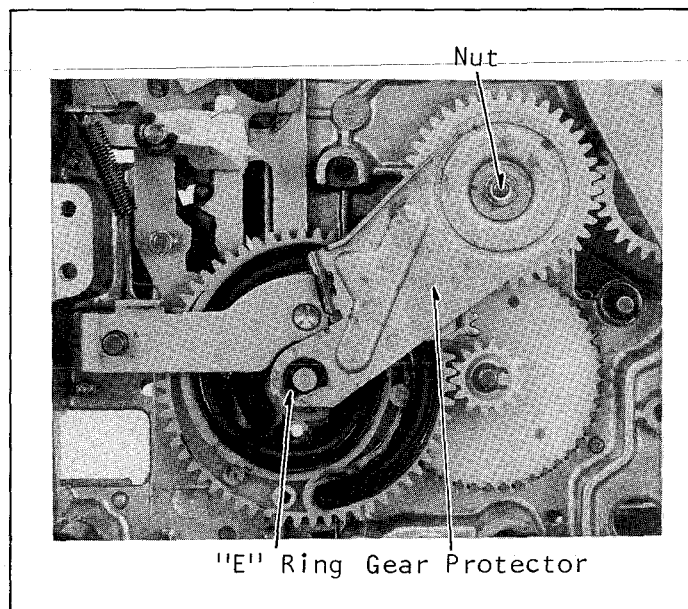


Fig. M58. Adjustment of Cam Gear and Mode Select Switch - (6)

7. Before installing the Cassette Lock Detector Unit, confirm that the Lock Lever Unit is set in the unlocked condition.

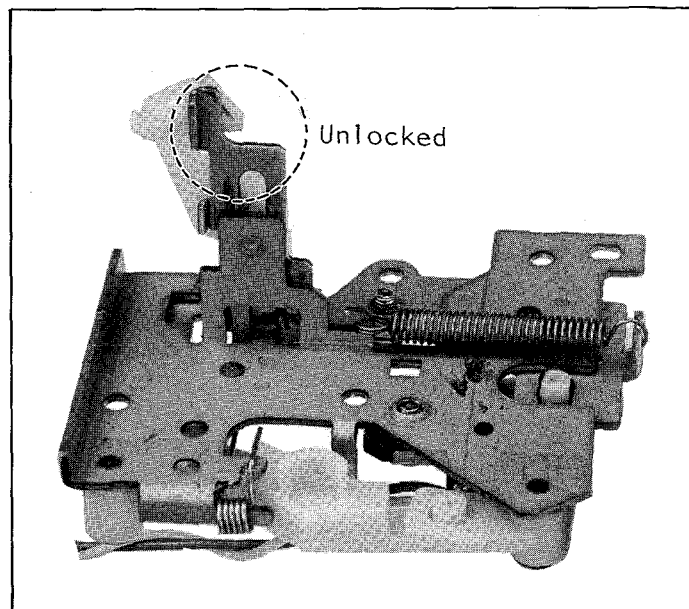


Fig. M59. Adjustment of Cam Gear and Mode Select Switch - (7)

8. Install the Cassette Lock Detector Unit through the hole on the chassis. While installing the cassette lock detector unit, make sure that the U-shaped tabs align with the main rod.

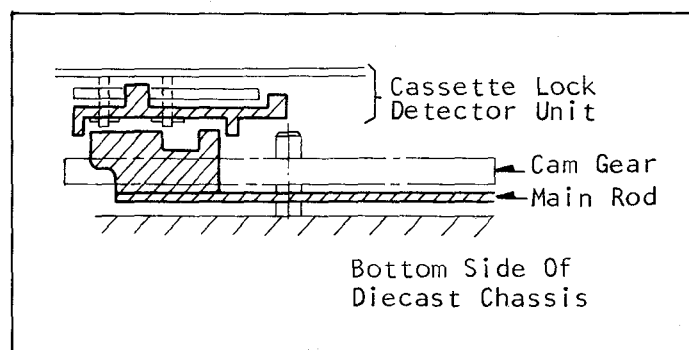


Fig. M60 Adjustment of Cam Gear and Mode Select Switch - (8)

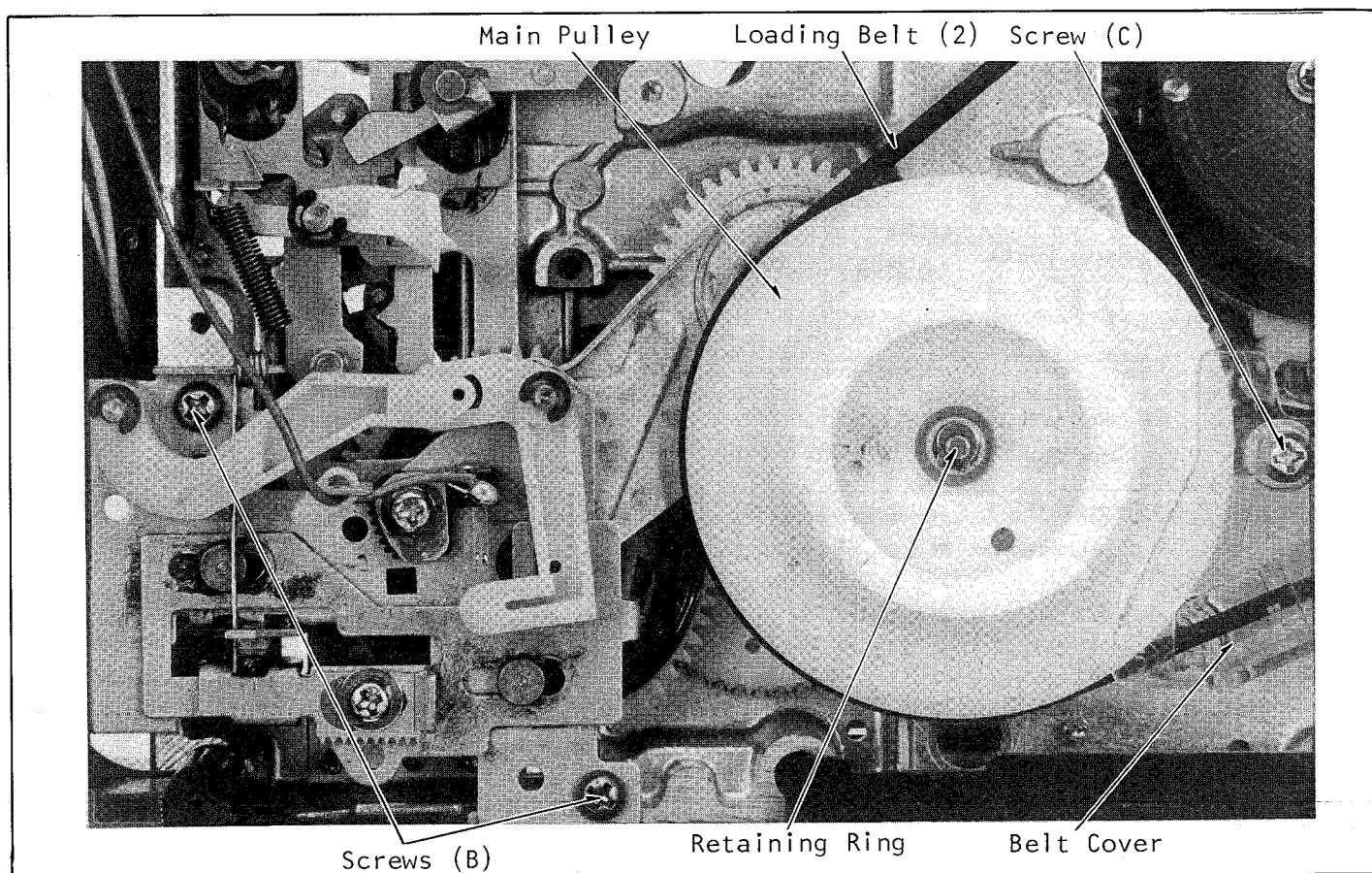


Fig. M61. Adjustment of Cam Gear and Mode Select Switch - (9)

9. Tighten 2 screws (B), install the main pulley so that its teeth contact the outer teeth of the intermediate gear. Then install a retaining ring to hold it. Install the loading belt (2) and belt cover and tighten a screw (C).
10. Install the reel motor bracket, kick pulley belt and tighten 4 screws (D).
11. Install the main idler unit, tighten a hex. screw, install the brake release bracket and tighten a screw (E).

Note:

Upon completion, check the operation of the deck.

12. (This step is the adjustment of Mode Select Switch.)
Move the main rod to the unloading completion condition, align the V-shaped notch of the switch and the tab on the main rod then tighten 2 screws (C). Upon completion, check the operation of the deck.

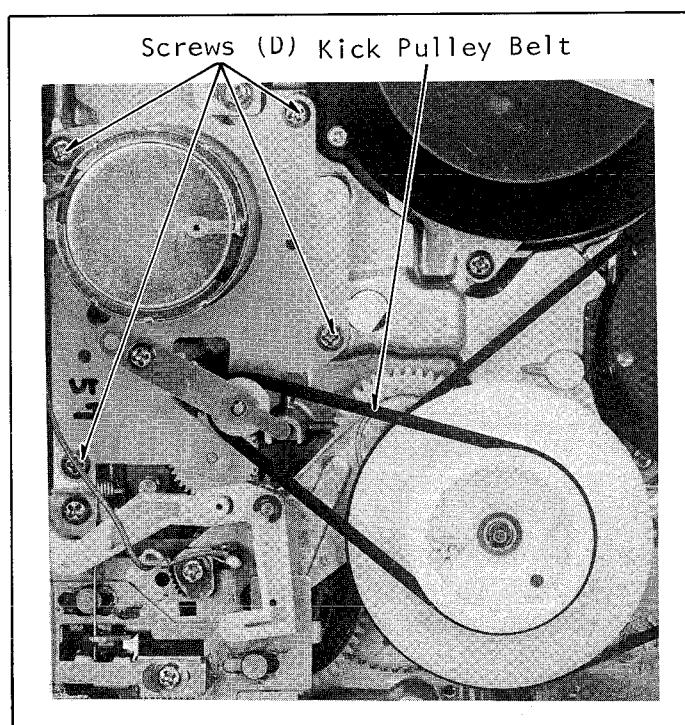


Fig. M62. Adjustment of Cam Gear and Mode Select Switch - (10)

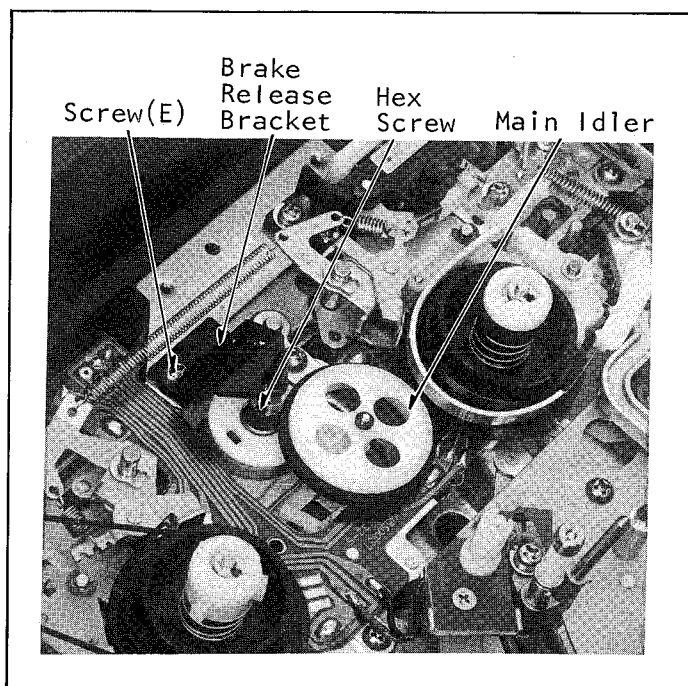


Fig. M63. Adjustment of Cam Gear and Mode Select Switch - (11)

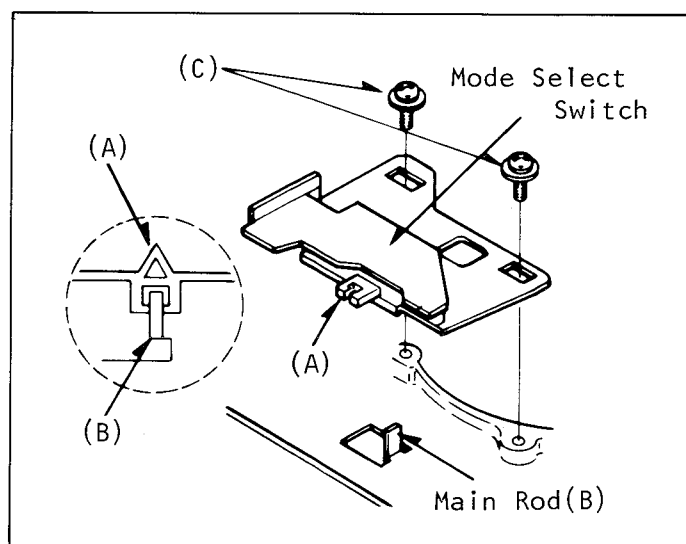


Fig. M64 Adjustment of Cam Gear and Mode Select Switch - (12)

18. ADJUSTMENT OF CASSETTE UP DETECTOR

NOTE: If the cassette lock detector unit is replaced, confirm these procedures.

* Equipment Required:
Fine Adjustment Screwdriver

..... VFK0136

1. Push the cassette lock lever down and loosen a screw (A). Insert the fine adjustment screwdriver to the hole (B). Turn the screwdriver clockwise till the switch closes.

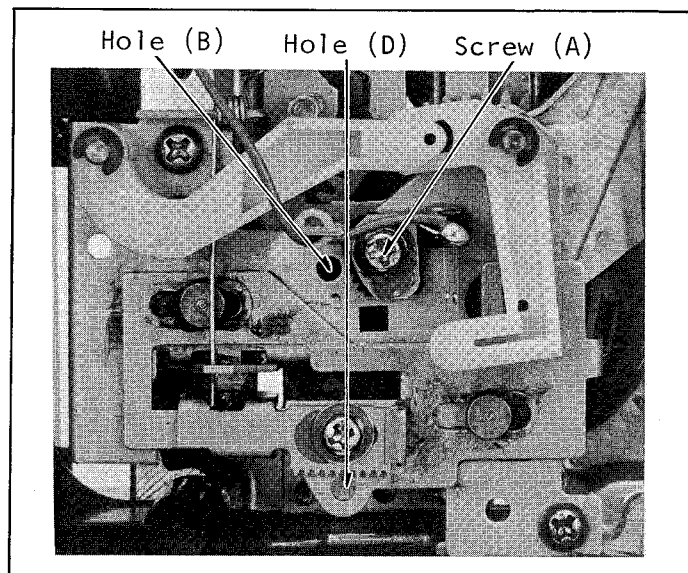


Fig. M65. Adjustment of Cassette Up Detector - (1)

Cassette Lock Lever	UP	DOWN
Eject Leaf Switch	OFF	ON

Fig. M66 Adjustment of Cassette Up Detector - (2)

2. Remove the cassette up holder, disconnect AC cord, turn the main pulley (on Fig. M61) fully clockwise so the mode select switch is set to Eject Mode and confirm the gap (C). Specification of gap (C) is 1.5 ~ 2.0 mm. If the gap (C) is out of specification, adjust the hole (D). (See Fig. M65.)

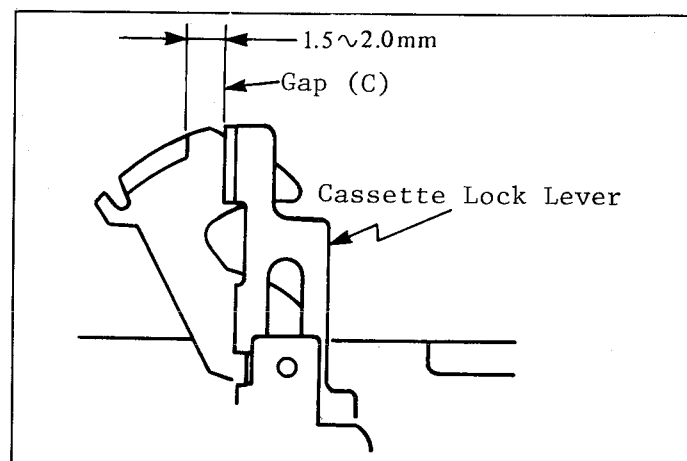

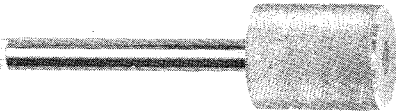

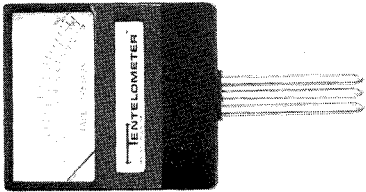
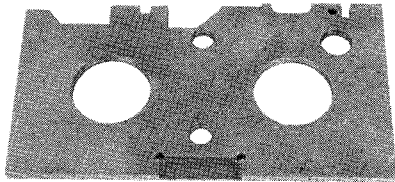
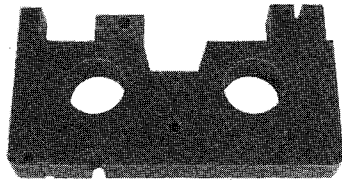
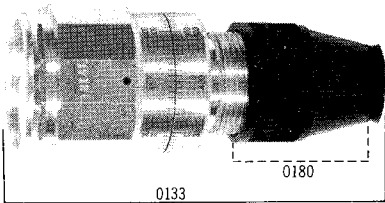
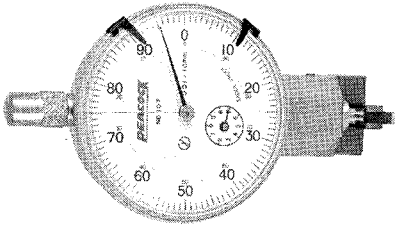
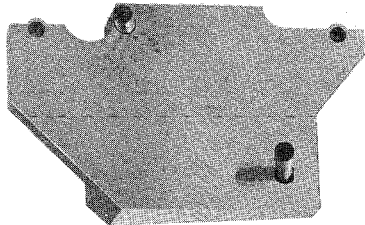
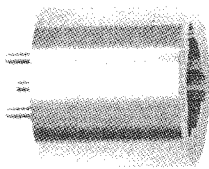
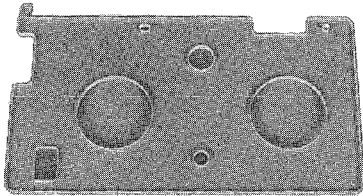


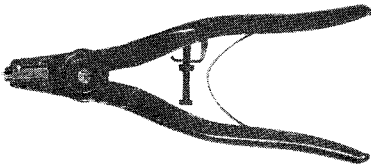
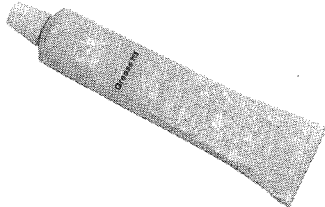
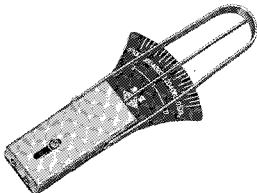
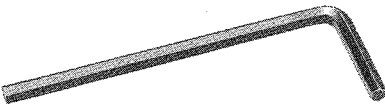



Fig. M67 Adjustment of Cassette Up Detector - (3)

Servicing Fixtures & Tools

VFMS0001H6 VHS Alignment Tape 	VFK0137 Post Adjustment Screwdriver 	VFKS0003 H-Position Adj Fixture 
Back Tension Meter (Tentelometer, Made in U.S.A.) 	VFKS0010 Post Adjustment Plate 	VFKS0004 Cassette Holder Fixture 
VFK0133 Dial Torque Gauge VFK0180 (Plastic Clamper Only) 	VFKS0009 Reel Table Height Fixture 	VFKS0007 V-Stopper Adj Fixture 
VFK0134 Adaptor for VFK0133 	VFKS0002 Tension Post Adj Fixture 	VFK27 Head Cleaning Stick 
VFK0136 Fine Adjustment Screwdriver (3mmφ) 	VFK0144 Retaining Ring Remover (3mmφ) VFK0145 Retaining Ring Remover (4mmφ) 	MOR265 Morlytone Grease 
VFK66 Fan-type Tension Gauge 	VFK0146 Hex. Wrench (0.9mm) VFK76 Hex. Wrench (1.5mm) VFK75 Hex. Wrench (1.25mm) 	VFKS0021 Fine Adjustment Screwdriver (3mmφ) 

ELECTRICAL ADJUSTMENT PROCEDURES

This section provides complete electrical adjustment procedures which may be required for electronic circuits of 3 speed selectable VHS video cassette recorder which 4 Head Noiseless Slow and Audio 2 Channel features.

1. TEST EQUIPMENT

To perform the electrical adjustment completely, the following equipment is required.

1. DVM (Digital Volt Meter)
Voltage Range: 0.001 - 50V
2. Dual-Trace Oscilloscope
Voltage Range: 0.005 - 50V/Div.
Frequency Range: DC - 10MHz
Probes: 10:1, 1:1
3. Frequency Counter
Frequency Range: 0 - 300MHz
4. Signal Generator
Sinewave: 0 - 10MHz
5. AC Millivolt Meter
Voltage Range: 0 - 0.3mVrms
: 0 - 3mVrms
6. Video Sweep Generation
7. VIF Sweep Generator/VIF Trap Adjuster
8. Spectrum Analyzer
9. DC Power Supply Unit
Voltage: 0 - 15V DC
10. Variable Attenuator
Attenuate: ± 0 dB - -50dB
11. TV Channel Signal Generator
12. Monitor Scope
13. Color TV Receiver or Monitor
14. Plastic Tip Driver and Non-Metal Driver
15. VHS Alignment Tape
VFMS0001H6

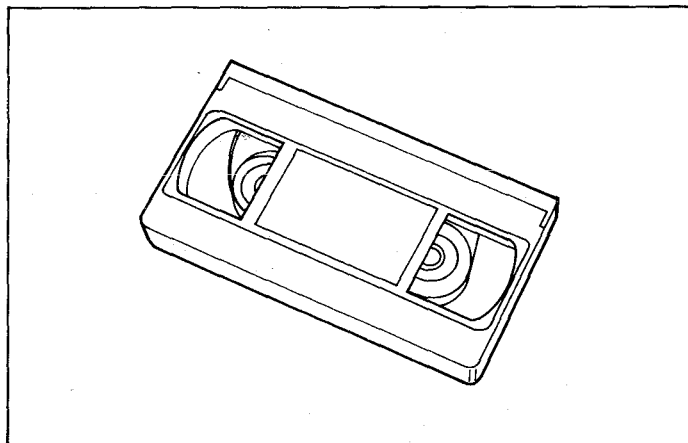


Fig. E1

Start Counter Reading	0 (0)	0020 \pm 8 (008 \pm 6)	0135 \pm 12 (060 \pm 6)	0240 \pm 20 (109 \pm 10)
Video	Blank	Monoscope	Color Bars	Multi-Burst
Audio	Blank	6kHz (MONO)	3kHz (STEREO)	1kHz (MONO)

Fig. E2

2. ADJUSTMENT PROCEDURES

These adjustment procedures consist of the following section.

1. Power Supply Section
2. Servo Section
3. Audio Section
4. Video Section
5. Programmable Timer Section
6. System Control Section
7. TV Demodulator Section

2-1. Power Supply Section

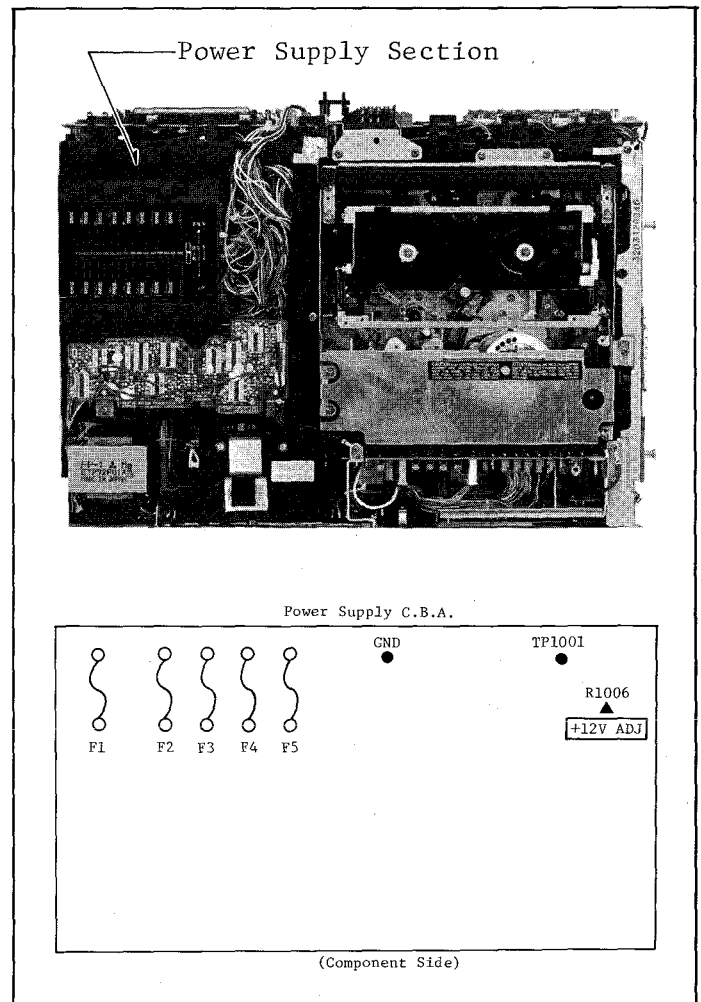


Fig. E3

2-1-1. +12V DC Adjustment

Test Point: TP1001

Adjustment: R1006 (+12V ADJ)

1. Check the AC input voltage for 120V AC.
2. Connect the DVM between TP1001 (+) and GND (-) on the Power Supply Board.
3. Place the unit in STOP mode.
4. Adjust the +12V ADJ (R1006) on the Power Supply Board for 12 + 0.1V DC.

2-2. Servo Section

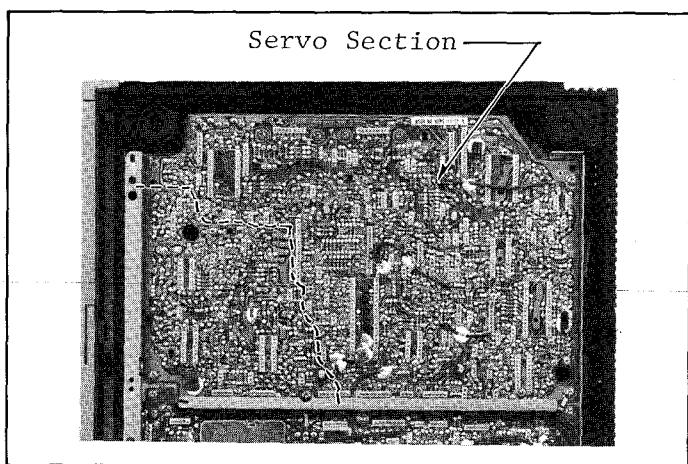


Fig. E4

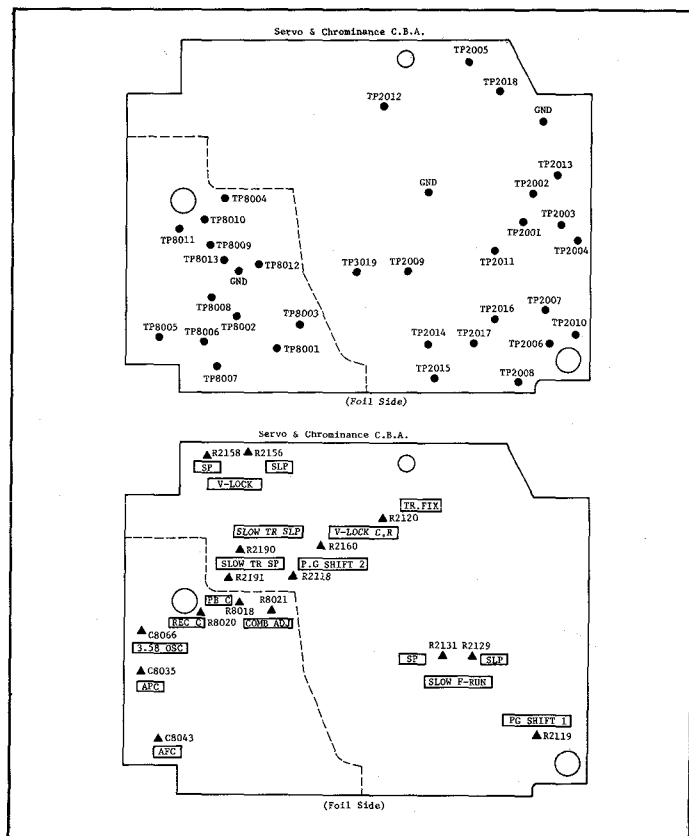


Fig. E5

2-2-1. Head Switching Position Adjustment

Test Points: TP2006, TP3018

Adjustments: R2118 (PG 1)

R2119 (PG 2)

1. Playback color bar section of the alignment tape.
2. Connect the scope CH1 to TP3018 on the Luminance section and CH2 to TP2006 on the Servo section. Set the scope to the CHOP mode.
3. Also set the scope to the Delay mode or expand the vertical interval of the signal from TP3018.
4. Adjust the PG 2 (R2119) so that the head switching point is $6H + 1H$, $-0.5H$ before the start of vertical sync as shown below.

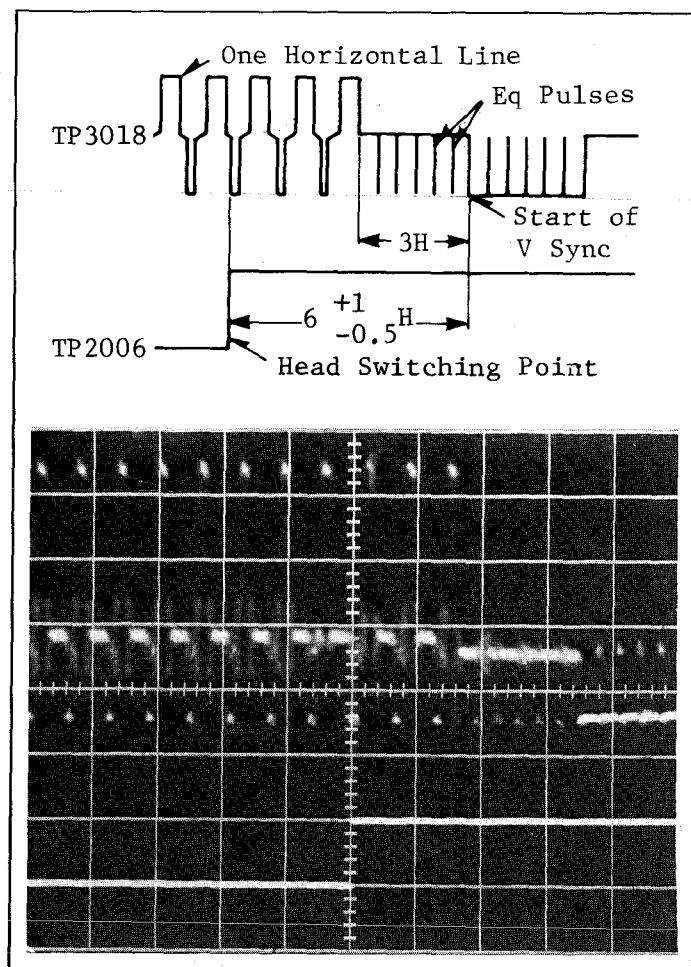


Fig. E6 TP3018 0.5V/0.1msec. div.

TP2006 5V/0.1msec. div.

5. Change the slope selector on the scope from "+" to "-" and adjust the PG 1 (R2118) so that the other head switching point is $6H + 1H$, $-0.5H$ before the start of vertical sync as shown below.

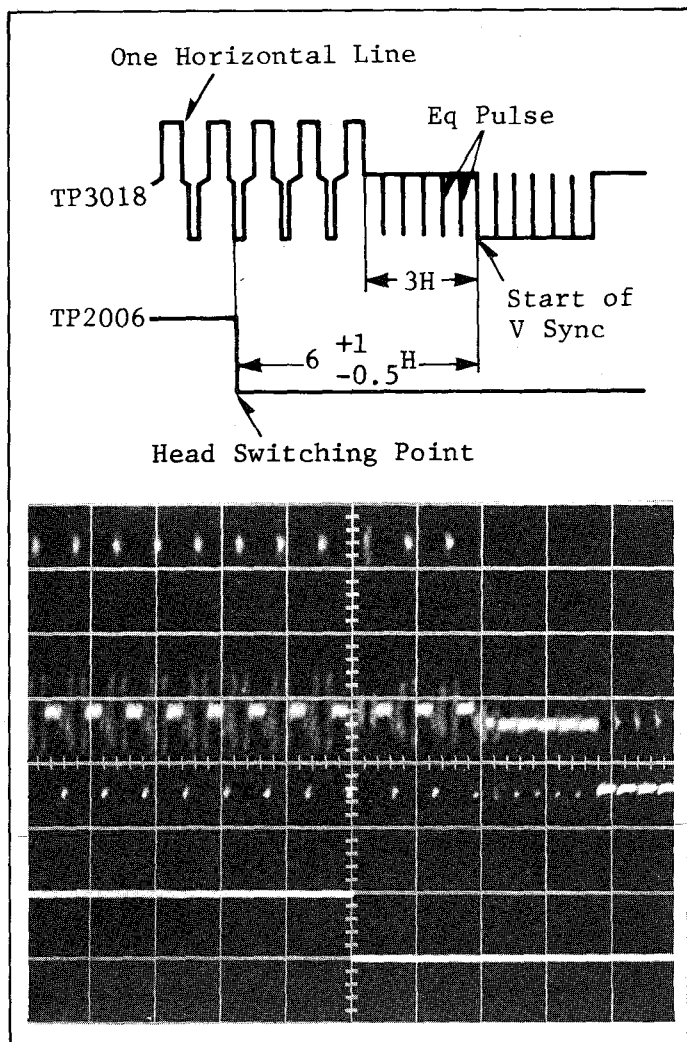


Fig. E7 TP3018 0.5V/0.1msec. div.
TP2006 5V/0.1msec. Div.

6. Then adjust PG 1 (R2118) on the servo board so that the difference between the rising edge and trailing edge is as shown Fig.E8. Change the slope selector on the scope the either \pm (plus) or - (minus) and adjust for less than $10\mu\text{sec}$.

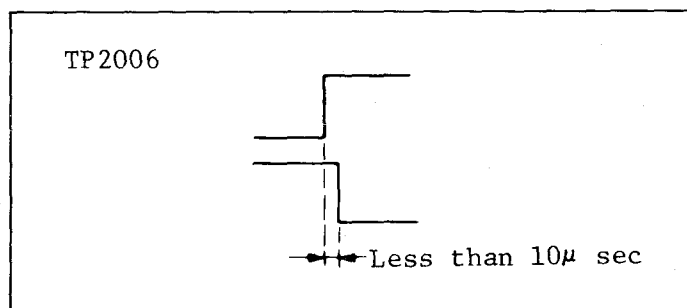


Fig. E8

2-2-2. Tracking FIX Adjustment

Test Points: TP2006, TP2010

Adjustment: R2120 (T. FIX)

1. Supply a video signal to Video Input on the rear panel or tune in a local TV program.
2. Turn the Tracking Control on the front panel to the center detent point.
3. Insert a cassette and make a recording in the SP mode for a few minutes.
4. Playback the portion just recorded.
5. Connect the scope CH1 to TP2006 and CH2 to TP2010 on the Servo section.
6. Adjust the T. FIX (R2120) so that the T is $6.2 \pm 0.2\text{msec}$.

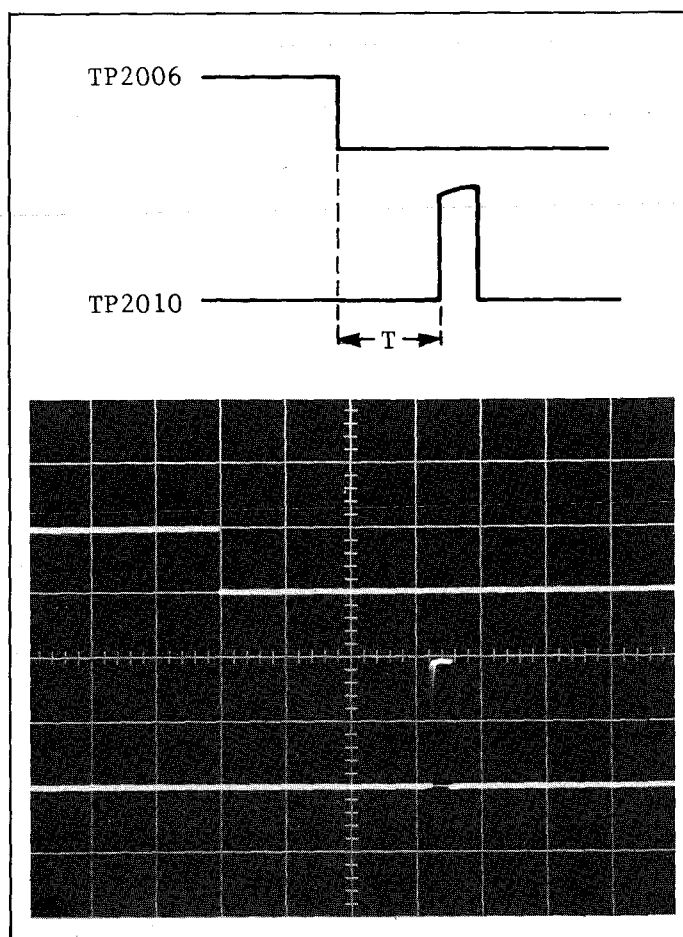


Fig. E9 TP2010 2V/2msec. div.
TP2006 5V/2msec. div.

2-2-3. Slow Free Run Adjustment

Test Point: TP2014

Adjustments: R2131 (SLOW-FR-SP)
R2129 (SLOW-FR-SLP)

1. Connect a jumper between TP2011 and GND.
2. Supply the video signal to the Video Input on the rear panel or tune in a local TV program.
3. Insert a cassette and make a recording in the SP mode.
4. Connect the frequency counter to TP2014 on the Servo section.
5. During recording adjust the SLOW-FR-SP (R2131) so that the frequency becomes $1835 \pm 10\text{Hz}$.
6. Change to SLP and make a recording.
7. During recording, adjust the SLOW-FR-SLP (R2129) so that the frequency is $612 \pm 10\text{Hz}$.
8. Remove the frequency counter.

2-2-4. Slow Tracking VR Adjustment

Equipment: TV monitor

Adjustments: R2191 (SLOW-TR-SP)
R2190 (SLOW-TR-SLP)

1. Supply a video signal to the Video Input on the rear panel or tune in a local TV program.
2. Insert a cassette and make a recording in the SP mode for a few minutes.
3. Playback the portion just recorded.
4. Turn the slow tracking VR on the front panel to the center detect point.
5. Press the slow key on the remote controller box.
6. Adjust the SLOW-TR SP (R2191) so that the noise band does not appear on the TV screen.

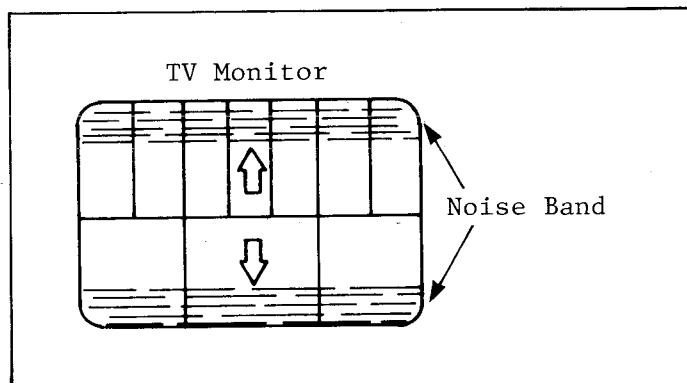


Fig. E10

7. Then, change to SLP and make a recording for a few minutes.
8. Playback the portion just recorded.
9. Press the slow key on the remote controller box.
10. Adjust the SLOW-TR-SLP (R2190) so that the noise band does not appear on the TV screen.

2-2-5. V Lock Pulse Adjustment

Test Point: TP2006, TP2015

Equipment: TV Monitor

Adjustments: R3232 (V-LOCK-PULSE)
R2156 (V-LOCK-SP)
R2158 (V-LOCK-SLP)
R2160 (V-LOCK-C.R)

1. Supply a color bar signal to the Video Input on the rear panel or tune in a local TV program.
2. Insert a cassette and make a recording in the SP mode for a few minutes.
3. Playback the portion just recorded, and push the PAUSE/STILL key.
4. Connect the scope CH1 to TP2006 and CH2 to TP2015 on the servo board. Set the scope to the CHOP mode.
5. Adjust the V-LOCK-PULSE (R3232) so that the T is $360 \pm 30\mu\text{sec}$.

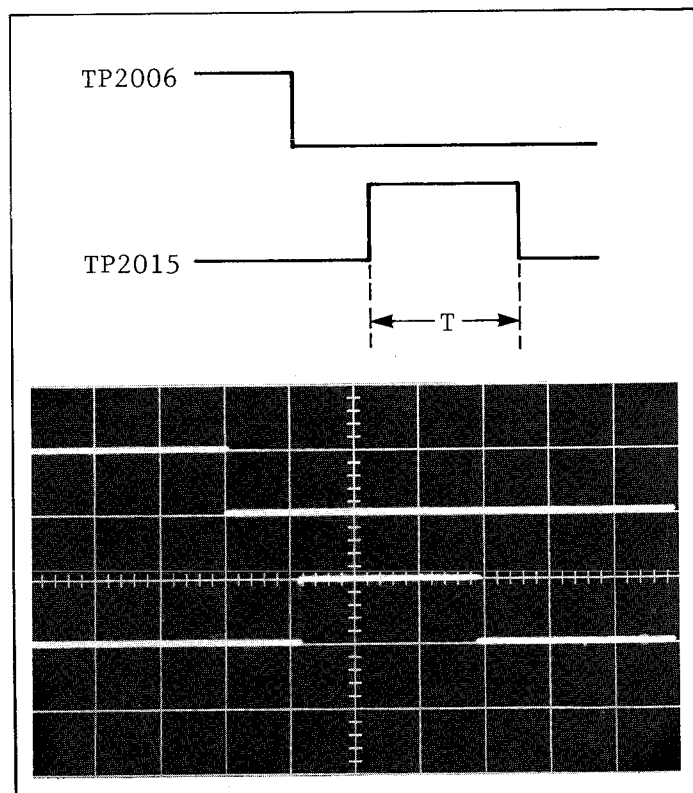


Fig. E11 TP2006 5V/0.2msec. div.
TP2015 1V/0.2msec. div.

6. Preadjust the V-LOCK-SP (R2156) so that the center of picture is most stable.

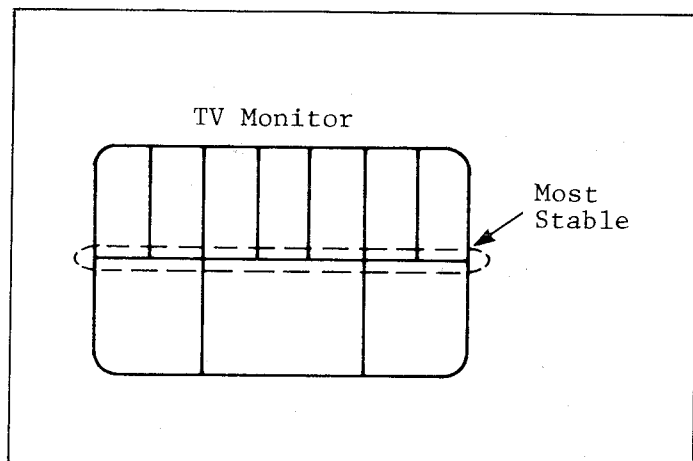


Fig. E12

7. Change the playback mode from PAUSE/STILL to DOUBLE SPEED.
8. Adjust the V-LOCK-SP (R2156) only if necessary again for a stable picture.
9. Place the unit in SLP mode and make a recording for a few minutes.
10. Playback the portion just recorded and push the PAUSE/STILL key.
11. Adjust the V-LOCK-SLP (R2158) same as in the SP mode.
12. Then, push the CUE key on the front panel of the deck in the SLP playback mode.
13. Adjust the V-LOCK-C.R (R2160) so that the center of picture is most stable.

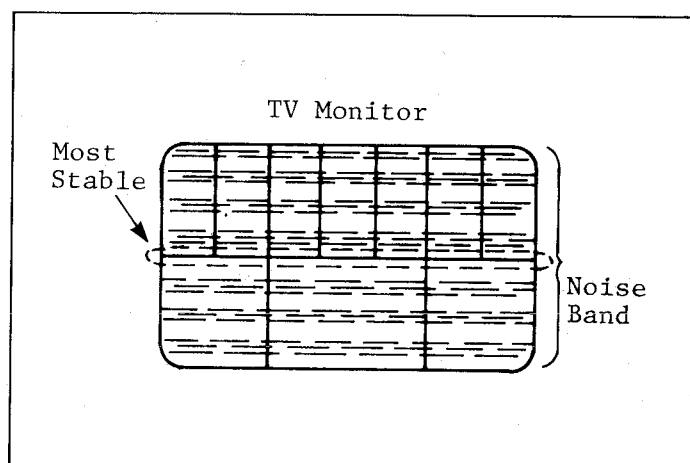
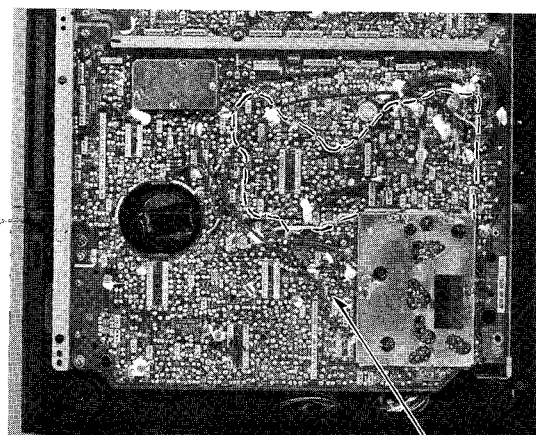


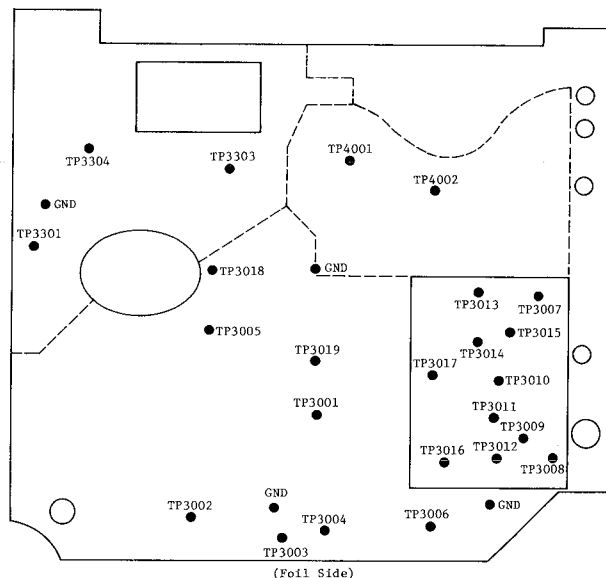
Fig. E13

2-3. Audio Section

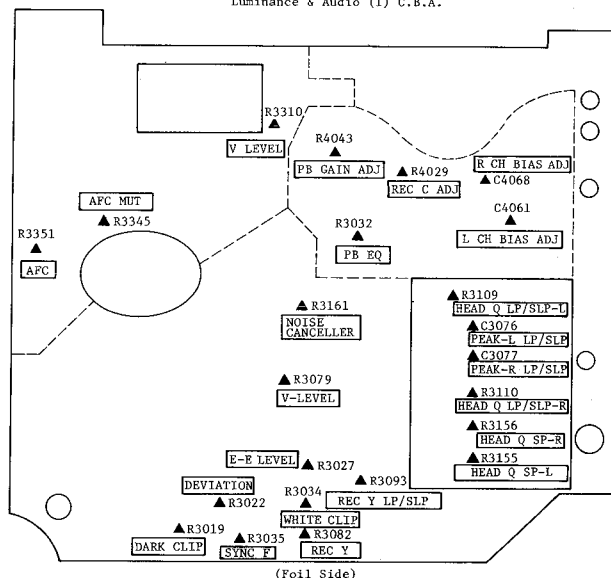


Audio Section

Luminance & Audio (I) C.B.A.



Luminance & Audio (I) C.B.A.



2-3-1. Bias Current Adjustment

Test Point: Audio Head Terminal (L,R)
Adjustments: C4061 (L CH, BIAS ADJ)
C4068 (R CH, BIAS ADJ)

1. Don't supply any audio signal to the AUDIO INPUT on the rear panel.
2. Insert a cassette and make a recording in the SP mode.
3. Connect the AC Millivolt Meter as shown below.

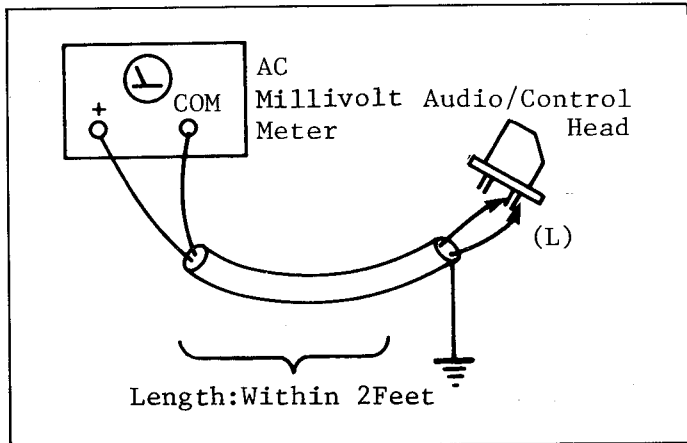


Fig. E15

4. While the recording is taking place, adjust the L CH BIAS ADJ (C4061) on the Audio Section so that the voltage is $1.1 \pm 0.05\text{mVrms}$.
5. Change the connected point of the AC Millivolt Meter as shown below.

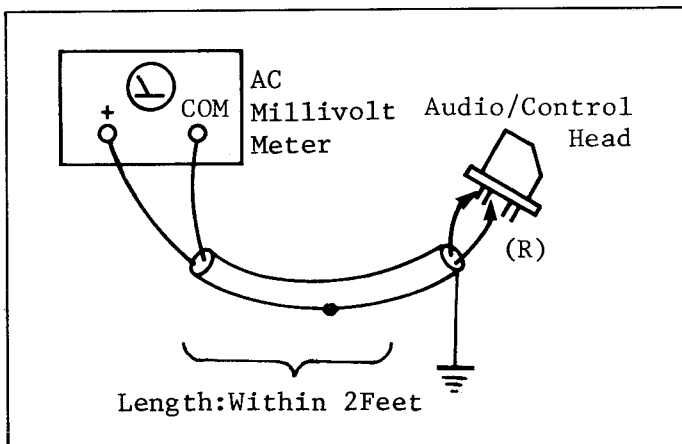


Fig. E16

6. During recording, adjust the R CH BIAS ADJ (C4068) on the Audio Section so that the Voltage is $1.1 \pm 0.05\text{mVrms}$.
7. Remove the AC Millivolt Meter.

2-3-2. Playback Gain Adjustment

Test Points: Audio Out Jack (R, L)
Adjustments: R4043 (PB GAIN-L)
R4413 (PB GAIN-R)

1. Playback Multi-Burst section (1kHz Audio) of the alignment tape.
2. Connect the RCA pin to Audio out jack (L CH and R CH) on the rear panel.
3. Connect the scope CH1 to audio out jack (L) and CH2 to audio out jack (R) on the rear panel as shown below.

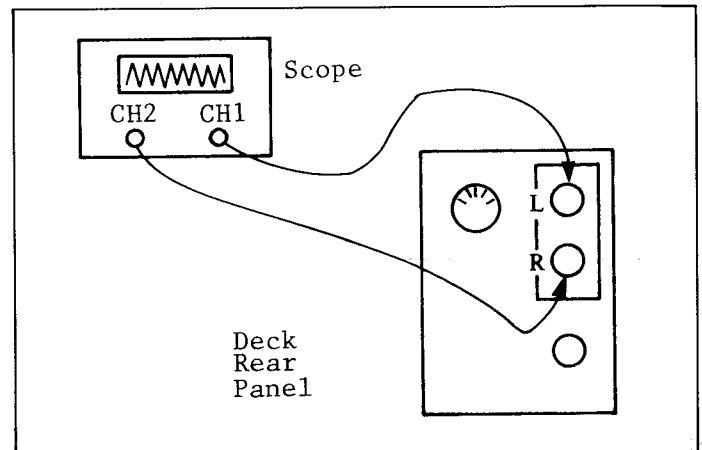


Fig. E17

4. Set the DOLBY NR Switch on the front panel is OFF.
5. Set the channel selector to CH1 mode and adjust the PB GAIN-L (R4043) on the Audio section so that the level of waveform is $300 \pm 10\text{mVp-p}$.

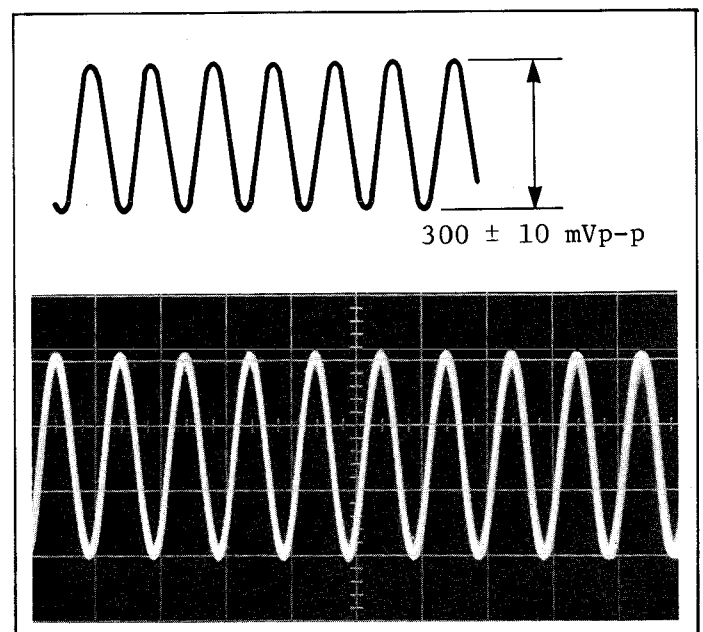


Fig. E18 Audio Out 0.1V/1msec. div.

6. Set the channel selector to CH2 mode and adjust the PB GAIN-R (R4413) on the Audio (II) & DOLBY board so that the level of waveform is $315 \pm 10\text{mVp-p}$.

2-3-3. Recording Gain Adjustment

Test Points: TP4402, TP4002

Adjustments: R4029 (REC LEVEL-L)
R4431 (REC LEVEL-R)

(L Channel)

1. Connect the Signal Generator to AUDIO IN (L) jack on the rear panel.
2. Supply a sinewave signal (1kHz, -10dB, 890mVp-p) from the Signal Generator.
3. Place the unit in SP recording mode.
4. Connect the scope to TP4002 on the Audio section and read the level of recording.
5. Playback the portion just recorded and read the level of playback.
6. Confirm that the Recording level and Playback level are the same level.
7. If the Recording level and Playback level doesn't the same level, during Recording, turn the REC LEVEL-L (R4029) some clockwise or counter clockwise.
(During adjust, changing level can't confirm at TP4002)
8. Repeat above step 6 and 7 for a couple of times.
(This adjustment must be repeated until recording level and playback level is the same.)

(R Channel)

1. Connect the Signal Generator to AUDIO IN (R) jack on the rear panel.
2. Supply a sinewave signal (1kHz, -10dB, 890mVp-p) from the Signal Generator.
3. Place the unit is SP recording mode.
4. Connect the scope to TP4402 on the Audio (II) & DOLBY board and read the level of recording.
5. Playback the portion just recorded and read the level of playback.
6. Adjust the REC LEVEL-R (R4431) same as L Channel mode.

2-3-4. Overall Frequency Response Adjustment

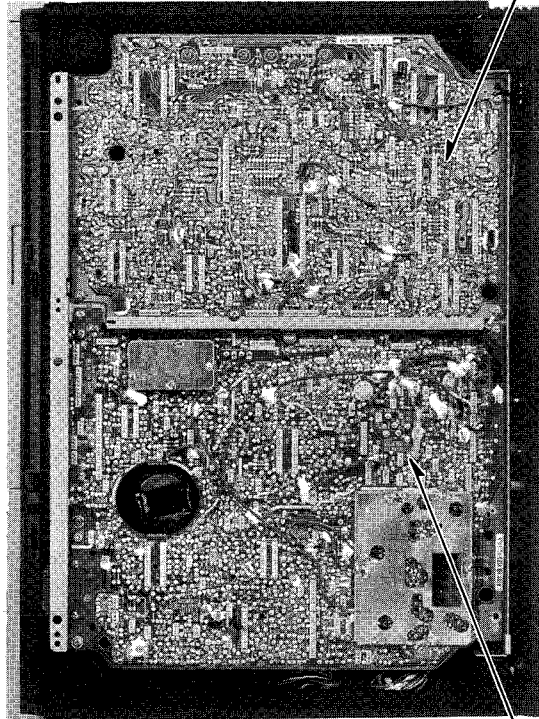
Test Points: TP4001 (L CH)
TP4401 (R CH)

Adjustments: R4032 (P.B EQ-L)
R4402 (P.B EQ-R)

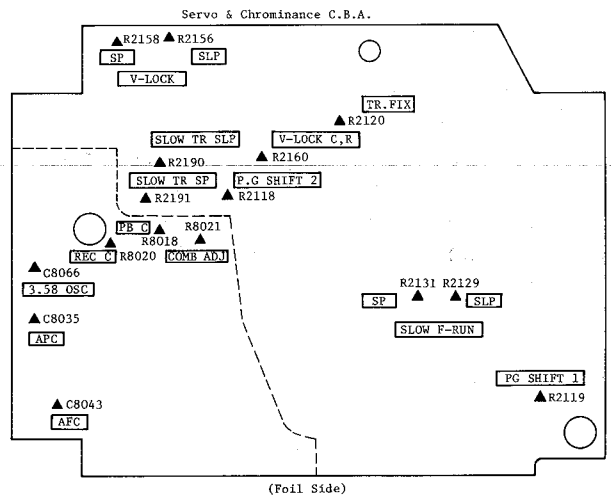
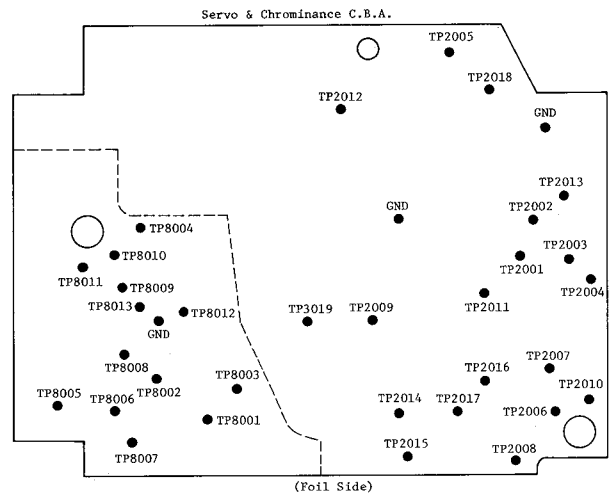
1. Supply the color bar signal to the Video Input on the rear panel.
2. Supply a sinewave signal (1kHz and 5kHz, -40dB, 28mVp-p) to the Audio input (L CH) on the rear panel.
3. Connect the AC Millivolt Meter to TP4001 on the Audio section.
4. Insert a cassette tape and make a recording 1kHz first then 5kHz.
5. Playback the portion just recorded.
6. Adjust the P.B EQ-L (R4032) on the Audio section so that the 1kHz and 5kHz outputs are balanced.
7. Then, connect the AC Millivolt Meter to TP4401 on the Audio (II) & DOLBY board.
8. Place the unit in SP mode and make a recording 1kHz first then 5kHz.
9. Playback the portion just recorded.
10. Adjust the P.B EQ-R (R4402) on the Audio (II) & DOLBY board so that the 5kHz output is $0 \pm 0.5\text{dB}$ of 1kHz output.
11. Remove the AC Millivolt Meter.

2-4. Video Section

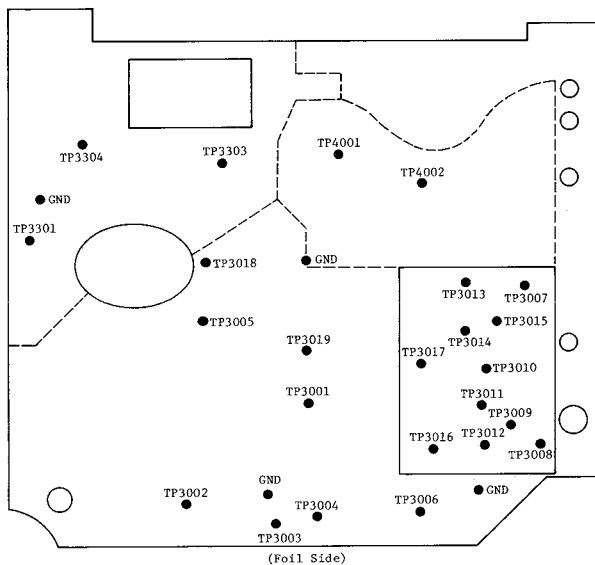
Servo & Chrominance Section



Luminance & Audio [I] Section



Luminance & Audio (I) C.B.A.



Luminance & Audio (I) C.B.A.

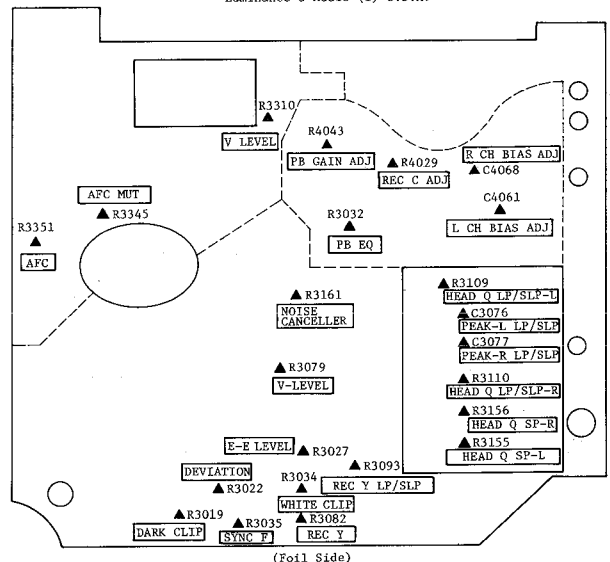


Fig. E19

2-4-1. Head Amp Peak Frequency Adjustment

Test Points: TP3016, TP3017

Adjustments: C3098 (PEAK-R ADJ-SP)
C3099 (PEAK-L ADJ-SP)
C3076 (PEAK-L ADJ-LP/SLP)
C3077 (PEAK-R ADJ-LP/SLP)

A: Factory Adjustment

1. Do not supply any video and RF signal on the rear panel.
2. Turn controls as follows.
(From Foil Side)
R3155 Fully Clockwise
R3156 Fully Counter-clockwise
R3110 Fully Clockwise
R3109 Fully Counter-clockwise
3. Connect the sweep generator to TP3008 on the Luminance section.

(1) SP mode

1. Connect a jumper between TP6002 and TP6003 on the System Control Board.
2. Connect a jumper between TP6001 and GND, and place the unit in the PLAY mode without a tape.
3. Connect the scope to TP3016 on the Luminance section. Put the marker on 4.7MHz.
4. Adjust the level of sweep generator to $200 \pm 50\text{mVp-p}$ at 4.7MHz on TP3016.
5. Adjust the (PEAK-R ADJ-SP) (C3098) and the (PEAK-L ADJ-SP) (C3099) so that the peak on the scope is $4.7 \pm 0.1\text{MHz}$.

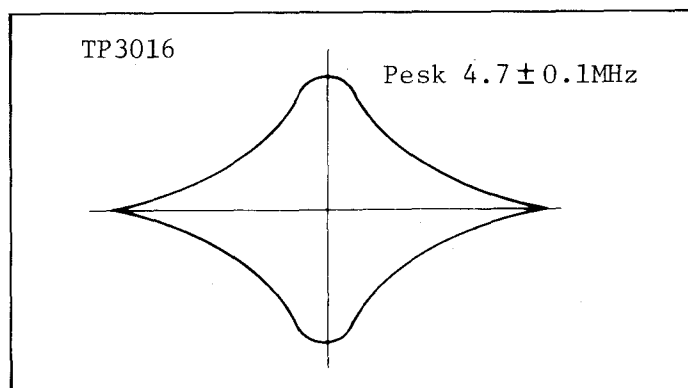


Fig. E20

6. Remove the jumpers.

(2) LP/SLP mode

1. Connect a jumper between TP6002 and TP6003.
2. Connect a jumper between TP6001 and GND, and place the unit in the PLAY mode without a tape.

3. Connect the scope to TP3017 on the Luminance section. Put the marker on 4.7MHz.
4. Adjust the level of sweep generator to $200 \pm 50\text{mVp-p}$ at 4.7MHz at TP3017.
5. Adjust the PEAK-L ADJ-LP/SLP (C3076) and the PEAK-R ADJ-LP/SLP (C3077) so that the peak of the waveforms is $4.7 \pm 0.1\text{MHz}$.
6. Remove the jumpers.

B: Field Adjustment

1. Do not supply any video or RF signal.
2. Turn controls as follows.
R3155 Fully Clockwise
R3156 Fully Counter-clockwise
R3110 Fully Clockwise
R3109 Fully Counter-clockwise
3. Connect the sinewave generator to TP3008 on the Luminance section.

(1) SP mode

1. Connect a jumper between TP6002 and TP6003 on the System Control board.
2. Connect a jumper between TP6001 and GND, and place the unit in the PLAY mode without a tape.
3. Connect the scope to TP3016 on the Luminance section.
4. Adjust the frequency of the sinewave generator to $4.7 \pm 0.1\text{MHz}$ at TP3016.
5. Adjust the level of the sinewave generator to $200 \pm 50\text{mVp-p}$ at TP3016.
6. Adjust the PEAK-R ADJ-SP (C3098) and the PEAK-L ADJ-SP (C3099) so that the envelope on the scope becomes maximum.

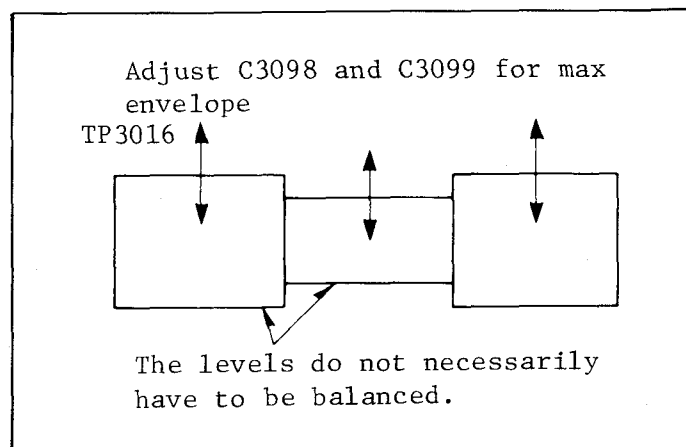


Fig. E21

7. Remove the jumpers.

(2) LP/SLP mode

1. Connect a jumper between TP6002 and TP6003, on the System Control board.
2. Connect a jumper between TP6001 and GND, and place the unit in PLAY mode without a tape.
3. Connect the scope to TP3017 on the Luminance section.
4. Adjust the frequency of the sinewave generator to $4.7 \pm 0.1\text{MHz}$ at TP3017.
5. Adjust the level of the sinewave generator to $200 \pm 50\text{mVp-p}$ at TP3017.
6. Adjust the PEAK-L ADJ-LP/SLP (C3076) and the PEAK-R ADJ-LP/SLP (C3077) so that the envelope on the scope becomes maximum.
7. Remove the jumpers.

2-4-2. Head Amp Frequency Response and Balance Adjustment

Test Points: TP3011, TP3012, TP3019
TP3015, TP3016

Adjustments: R3156 (HEAD Q SP R)
R3155 (HEAD Q SP L)
R3110 (HEAD Q LP/SLP R)
R3109 (HEAD Q LP/SLP L)

For this adjustment, the following connections and preset are required.

A: Factory Adjustment

1. Supply the V sync to Video Input on the rear panel.
2. Connect jumper between TP3003 and GND to prevent the video signal except composite syncs from being applied to the following circuits.
3. Connect the sweep generator to TP3004. Put the marker on 2MHz, 3.4MHz and 4.5MHz.

(1) SP mode

1. Connect the scope between TP3011 (HOT) and TP3012 (GND) on the Luminance section.
2. Insert a cassette and make a recording in the SP mode for a few minutes.
3. Adjust the level of sweep generator to 180mVp-p at 3.4MHz.

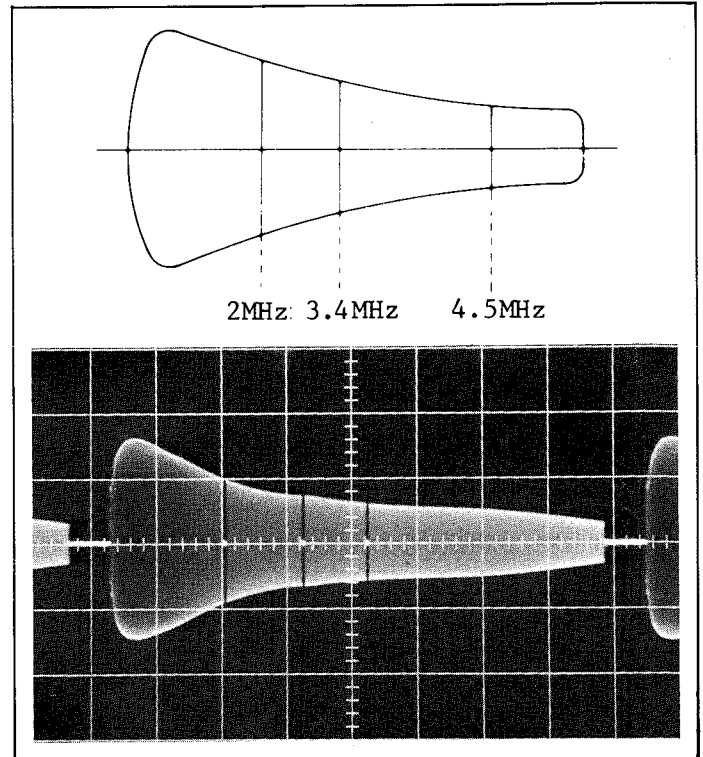


Fig. E22 TP3011 0.1V/2msec. div.

4. Playback the portion just recorded.
5. Connect the scope to TP3016. Trigger the scope with TP2006.
6. Remove the Sweep Generator.
7. Connect a jumper between TP3010 and GND.
8. Adjust the HEAD Q SP-L (R3155) so that the levels at 2MHz and 4.5MHz are as shown below.

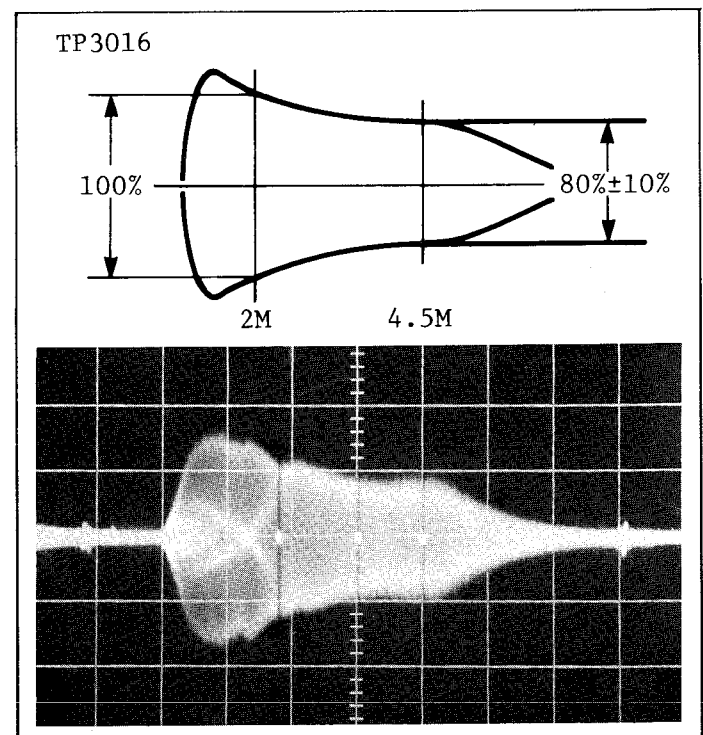


Fig. E23 0.2V/2msec. div.

9. Remove the jumper between TP3010 and GND.
10. Connect the jumper between TP3011 and GND.
11. Adjust the HEAD Q SP R (R3156) so that the levels at 2MHz and 4.5MHz are same as item 8.
12. Remove the jumpers.

(2) LP/SLP mode

1. Connect the scope between TP3014 (HOT) and TP3015 (GND).
2. Insert a cassette and make a recording in the LP mode for a few minutes.
3. Adjust the Sweep Generator so that the level at 3.4MHz is 150mVp-p at TP3014.
4. Playback the portion just recorded.
5. Connect the scope to TP3017. Trigger the scope with TP2006.
6. Remove the Sweep Generator.
7. Connect the jumper between TP3014 and GND.
8. Adjust the HEAD Q LP/SLP L (R3109) so that the level between 2.5MHz and 4.5MHz is same as in the SP mode.
9. Remove a jumper between TP3014 and GND.
10. Connect the jumper between TP3013 and GND.
11. Adjust the HEAD Q LP/SLP R (R3110) same as item 8.
12. Remove the jumpers.

B: Field Adjustment

1. Supply a B/W signal to the Video Input or tune in a local TV program.
2. Connect jumper between TP3003 and GND to prevent the video signal except composite syncs from being applied to the following circuits.
3. Connect the sinewave generator to TP3004 on the Luminance section.

(1) SP mode

1. Set the frequency of the sinewave generator to 3.4MHz.
2. Connect the scope between TP3011 (HOT) and TP3012 (GND) on the Luminance section.
3. Insert a cassette and make a recording in the SP mode for a few minutes.
4. Adjust the output level of the sinewave generator at TP3011 is 140 mVp-p.
5. Change the frequency of the sinewave generator from 3.4MHz to 2.0MHz and make a recording for about 10sec.

6. Then, change the frequency from 2.0 MHz to 4.5MHz and make a recording for about 10sec.
7. Repeat above steps 5 and 6 for a couple of times.
8. Playback the portion just recorded.
9. Connect the scope to TP3016 on the Luminance section. Trigger the scope with TP2006.
10. Remove the Sinewave Generator.
11. Connect a jumper between TP3010 and GND.
12. Adjust the HEAD Q SP-L (R3155) so that the level at 4.5MHz is $80\% \pm 10\%$ of level at 2MHz.
13. Remove a jumper between TP3010 and GND.
14. Connect the jumper between TP3011 and GND.
15. Adjust the HEAD Q SP-R (R3156) same as item 12.
16. Remove the jumpers.

(2) LP/SLP mode

1. Set the frequency of sinewave generator to 3.4MHz.
2. Connect the scope between TP3014 (HOT) and TP3015 (GND).
3. Insert a cassette and make a recording in the LP mode for a few minutes.
4. Adjust the output level of the sinewave generator so that the level at TP3015 is 150mVp-p.
5. Change the frequency of the sinewave generator from 3.4MHz to 2.0MHz and make a recording for about 10sec.
6. Then, change the frequency from 2.0MHz to 4.5MHz and make a recording for about 10sec.
7. Repeat above steps 5 and 6 for a couple of times.
8. Playback the portion just recorded.
9. Connect the scope to TP3017 on the Luminance section. Trigger the scope with TP2006.
10. Remove the sinewave Generator.
11. Connect a jumper between TP3014 and GND.
12. Adjust the HEAD Q LP/SLP L (R3109) so that the levels at 2MHz and 4.5 MHz are same as in the SP mode.
13. Remove a jumper between TP3014 and GND.
14. Connect a jumper between TP3013 and GND.
15. Adjust the HEAD Q LP/SLP R (R3110) same as item 12.
16. Remove the jumpers.

2-4-3. E-E Level Adjustment

Test Point: TP3018

Adjustment: R3027 (E-E LEVEL)

1. Supply a video signal (1Vp-p) to the Video Input on the rear panel.
2. Connect the scope to TP3018 on the Luminance section.
3. Place the unit in STOP mode.
4. Adjust the E-E LEVEL ADJ (R3027) on the Luminance section so that the video level is $2.0 \pm 0.1\text{Vp-p}$.

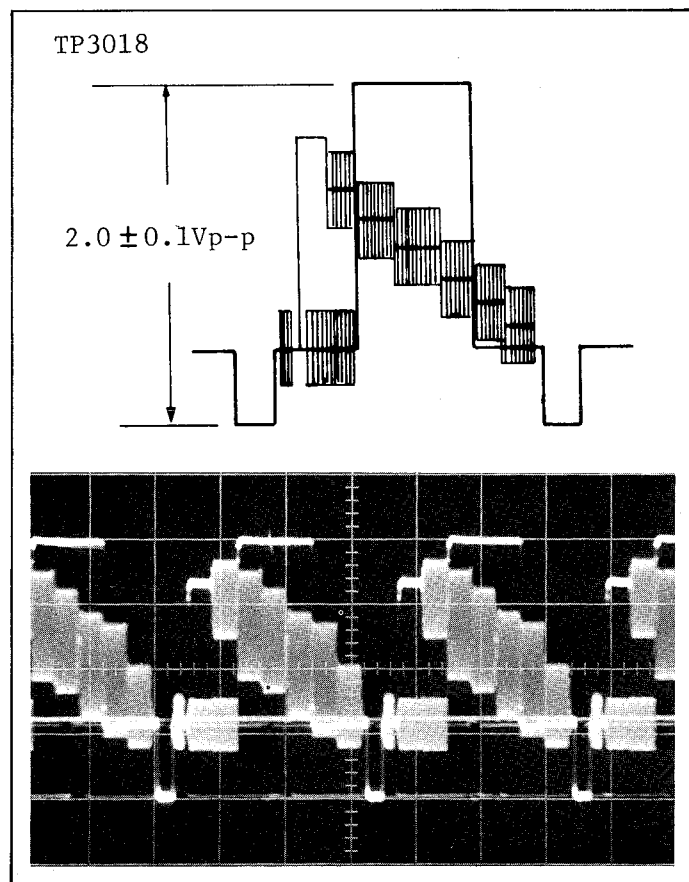


Fig. E24 TP3018 0.5V/20μsec. div.

2-4-4. Sync Tip Frequency and Deviation Adjustment

Test Point: TP3003

Adjustments: R3035 (SYNC TIP FREQ)
R3022 (DEVIATION)

1. Don't supply any video signal or RF signal on the rear panel.
2. Connect the frequency counter to TP3003 on the Luminance section.
3. Insert a cassette and place the unit in SP REC mode.

4. Adjust the SYNC TIP FREQ (R3035) the frequency is $3.4 \pm 0.05\text{MHz}$.
5. Remove the frequency counter.
6. Connect a jumper between collector of Transistor Q3037 and pin 4 of jumper JD on the Luminance section.
7. Connect a signal generator (sine-wave) to TP3003 through a $1\text{k}\Omega$ resistor and a $0.01\mu\text{F}$ capacitor.

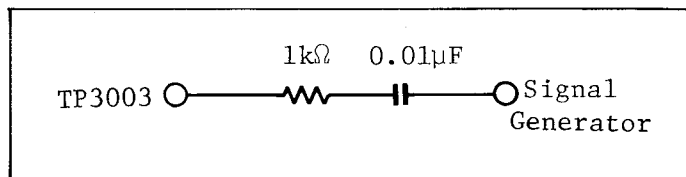


Fig. E25

8. Prior to this adjustment, turn the WHITE CLIP (R3034) and the DARK CLIP (R3019) center position.
9. Supply a NTSC Color bar (Split field) signal to Video Input on the rear panel.
10. Connect the 1000PF capacitor between junction of R3161 and L3032, and GND.

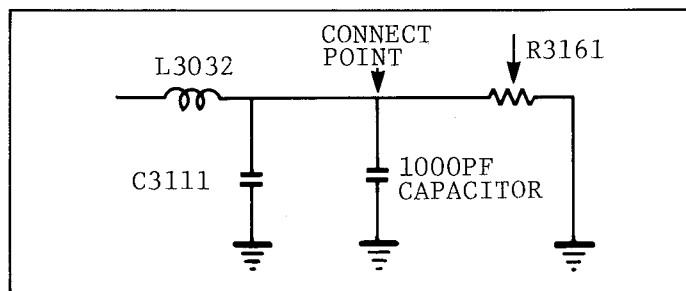


Fig. E26

11. Connect the scope to the junction of R3161 and L3032 on the Luminance section.
12. Place the unit in SP Recording mode.
13. Set the frequency of the signal generator to $4.35\text{MHz} \pm 30\text{kHz}$.
14. Adjust the DEVIATION (R3022) for minimum carrier at peak white.

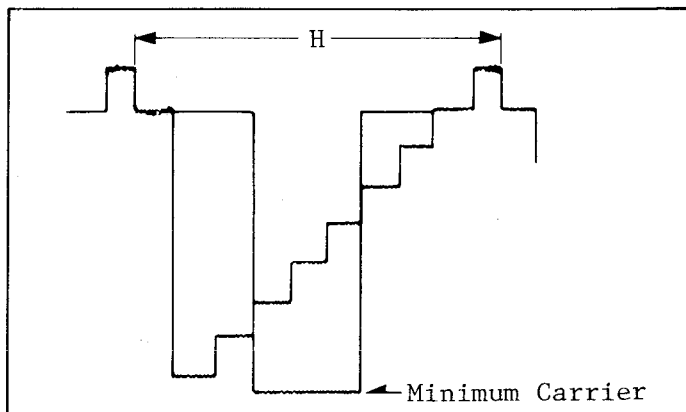


Fig. E27

15. Remove the jumpers, resistors and capacitors.
16. Make White and Dark Clip adjustment.

2-4-5. White and Dark Clip Adjustment

Test Point: TP3002

Adjustments: R3019 (DARK CLIP)
R3034 (WHITE CLIP)

1. Supply a color bar signal to the Video Input on the rear panel.
2. Connect the scope to TP3002 on the Luminance section.
3. Insert a cassette and make a recording in the LP mode.
4. Adjust the WHITE CLIP (R3034) and the DARK CLIP (R3019) on the same section so that the overshoot and undershoot are as shown below.

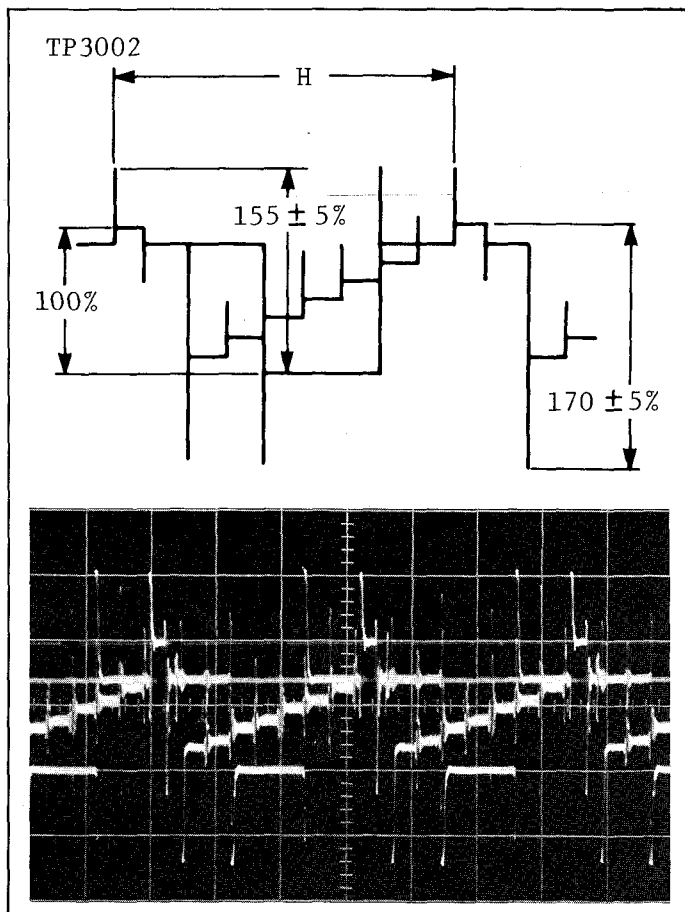


Fig. E28 TP3002 0.2V/20μsec. div.

2-4-6. Recording Current Adjustment

(SP mode)

Test Points: TP3011, TP3012

Adjustments: R3082 (REC CURR)
R8020 (REC CHROMA)

1. Supply the color bar signal to the video input on the rear panel.

2. Insert a cassette and make a recording in the SP mode.
3. Connect the scope between TP3011 (HOT) and TP3012 (GND) on the Luminance section.
4. Turn the REC CURR (R3082) fully clockwise from foil side.
5. Adjust the REC CHROMA (R8020) on the Chrominance section so that the level of cyan portion is 46 ± 1 mVp-p.

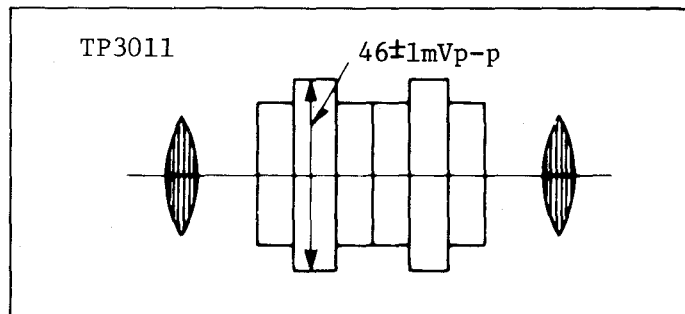


Fig. E29

6. Then slowly turn the REC CURR (R3082) so that the V sync portion of the envelope at TP3011 is 180 ± 5 mVp-p.

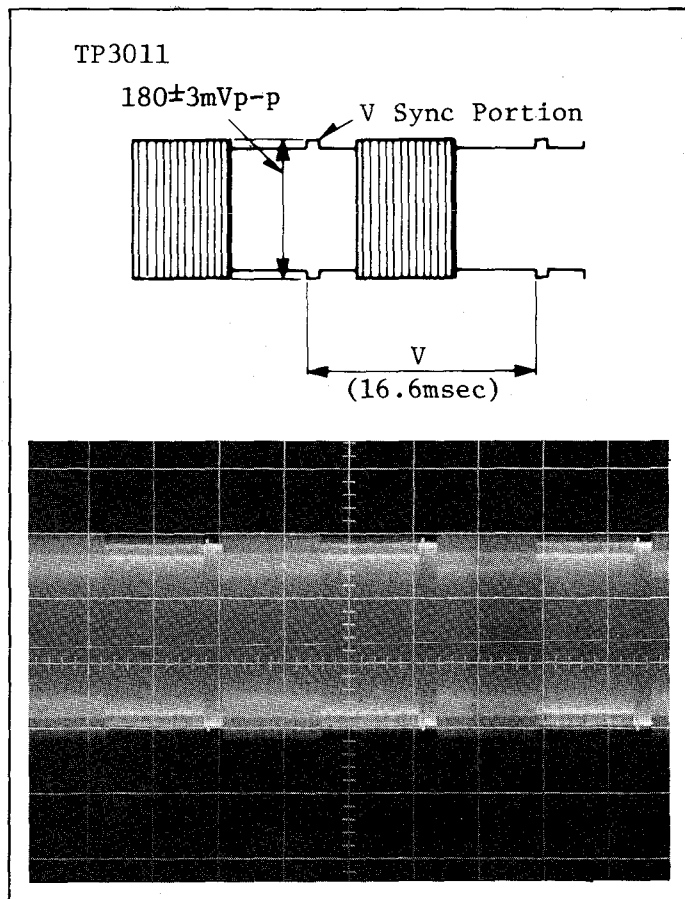


Fig. E30 TP3011 50mV/5msec. div.

(LP/SLP mode)

Test Points: TP3014, TP3015

Adjustment: R3093 (LP/SLP REC CURRENT)

1. Place the unit in LP RECORDING mode.
2. Connect the scope between TP3014 (HOT) and TP3015 (GND) on the Luminance section.
3. Adjust the LP/SLP REC CURRENT (R3093) so that the V sync portion of the envelope at TP3014 is $150 \pm 5\text{mVp-p}$.

2-4-7. 3.58MHz Crystal Oscillator Adjustment

Test Point: TP8012

Adjustment: C8066 (3.58MHz OSC)

1. Don't supply any video and RF signal. Turn the Input Select SW to CAMERA side.
2. Place the unit in STOP mode.
3. Connect the frequency counter to TP8012 on the Chrominance section.
4. Adjust the 3.58MHz OSC (C8066) so that the frequency at TP8012 is $3.579545\text{MHz} \pm 10\text{Hz}$.

2-4-8. AFC Adjustment

Test Point: TP8007

Adjustment: R8043 (AFC)

1. Don't supply any video signal to the Video Input on the rear panel. Turn the Input Select SW to CAMERA side.
2. Insert a cassette and make a recording
3. Connect the frequency counter to TP8007 on the Chrominance section.
4. Adjust the AFC (R8043) on the Chrominance section so that the frequency is $15.734\text{kHz} \pm 50\text{Hz}$.

2-4-9. APC 3.58MHz VXO Adjustment

Test Point: TP8011

Adjustment: C8035 (APC)

1. Connect a jumper between TP8002 and GND.
2. Connect a jumper between TP8009 and GND.
3. Connect a jumper between TP8008 and GND through a resistor $39\text{k}\Omega$.
4. Place the unit in REC mode.
5. Connect the frequency counter to TP8011 on the Chrominance section.

6. Adjust the APC (C8035) so that the frequency is $3.579545\text{MHz} \pm 50\text{Hz}$.
7. Remove the jumpers and resistors.

2-4-10. Comb Filter Adjustment

Test Point: TP3018

Adjustment: R8021 (COMB ADJ)

1. Supply a color bar signal to the Video Input on the rear panel.
2. Insert a cassette and make a recording in the SLP mode.
3. Connect the scope to TP3018 on the Chrominance section.
4. Playback the portion just recorded.
5. Turn the Tracking Control on the front panel for the poorest tracking. (Worst playback image.)
6. During playback, adjust the COMB ADJ (R8021) on the Chrominance section as shown below.

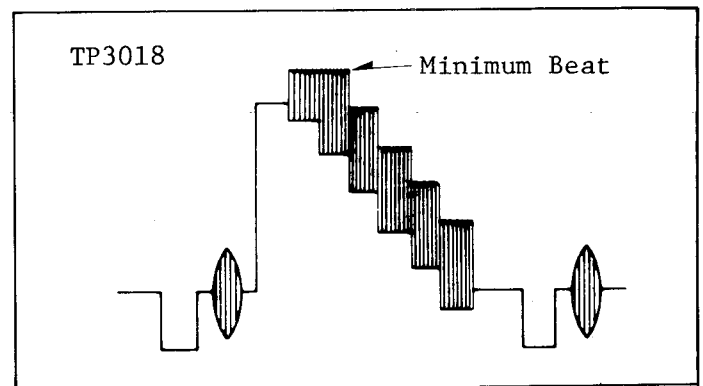


Fig. E31

2-4-11. Playback Level Adjustment

Test Point: TP3018

Adjustments: R3079 (VIDEO LEVEL)
R8018 (P.B CHROMA)

1. Supply a color bar signal (1Vp-p) to the Video Input on the rear panel.
2. Insert a cassette and make a recording in the SP mode for a few minutes.
3. Connect the scope to TP3018 on the Luminance section.
4. Playback the portion just recorded.
5. During playback, adjust the VIDEO LEVEL (R3079) so that the video level is $2.0 \pm 0.1\text{Vp-p}$.
6. Then, adjust the P.B CHROMA (R8018) so that the cyan level is $1.2 \pm 0.25\text{Vp-p}$.

TP3018

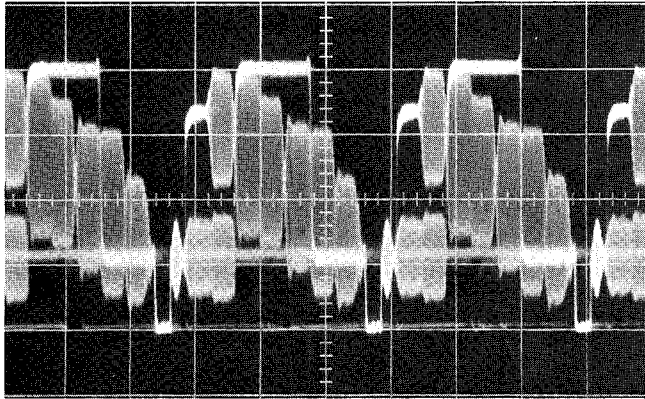
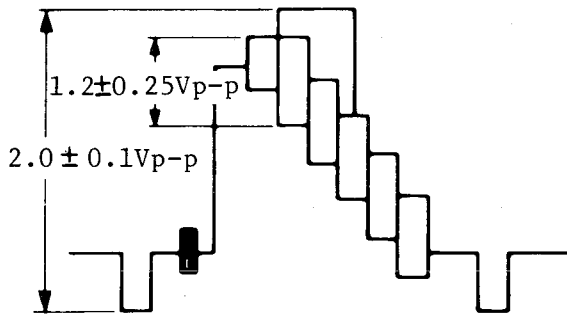


Fig. E32 TP3018 0.5V/20μsec. div.

2-4-12. Low Frequency Noise Canceler Adjustment

Test Point: TP3019

Adjustment: R3161 (LINE NOICAN)

1. Supply a color bar signal to the Video Input on the rear panel.
2. Place the unit in the LP mode and make a recording for a few minutes.
3. Playback the portion just recorded.
4. Connect the scope to TP3019 on the Luminance section.
5. During playback, adjust the LINE NOICAN (R3161) so that the width (W) of signal at TP3019 is minimum.

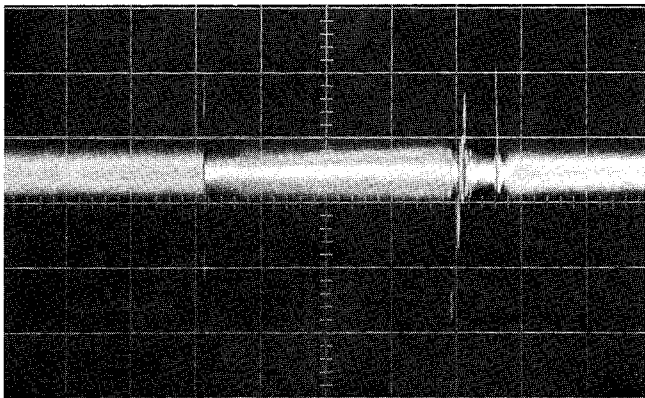


Fig. E33 TP3019 50mV/2msec. div.

2-4-13. 0.5H Delayed Video Level Adjustment

Test Point: TP3018

Equipment: TV monitor

Adjustment: R3310 (VIDEO LEVEL)

1. Supply the color bar signal to the Video Input on the rear panel.
2. Insert a cassette and make a recording in the LP mode for a few minutes.
3. Connect the scope to TP3018 on the Luminance section.
4. Playback the portion just recorded.
5. Push the FAST REVIEW button.
6. Adjust the VIDEO LEVEL (R3310) so that the white level of video signal is as shown below.

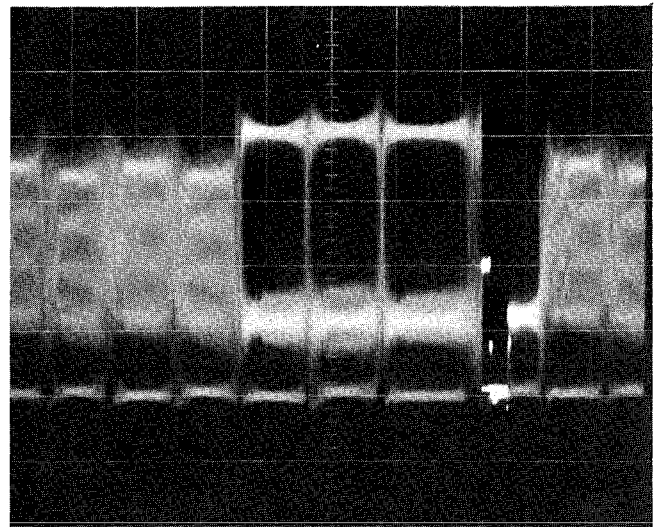
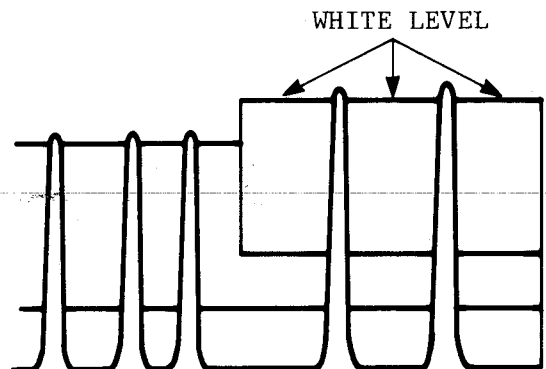


Fig. E34 TP3018 0.5V/2msec. div.

7. In case of misadjustment, white level of video signal is as shown below.

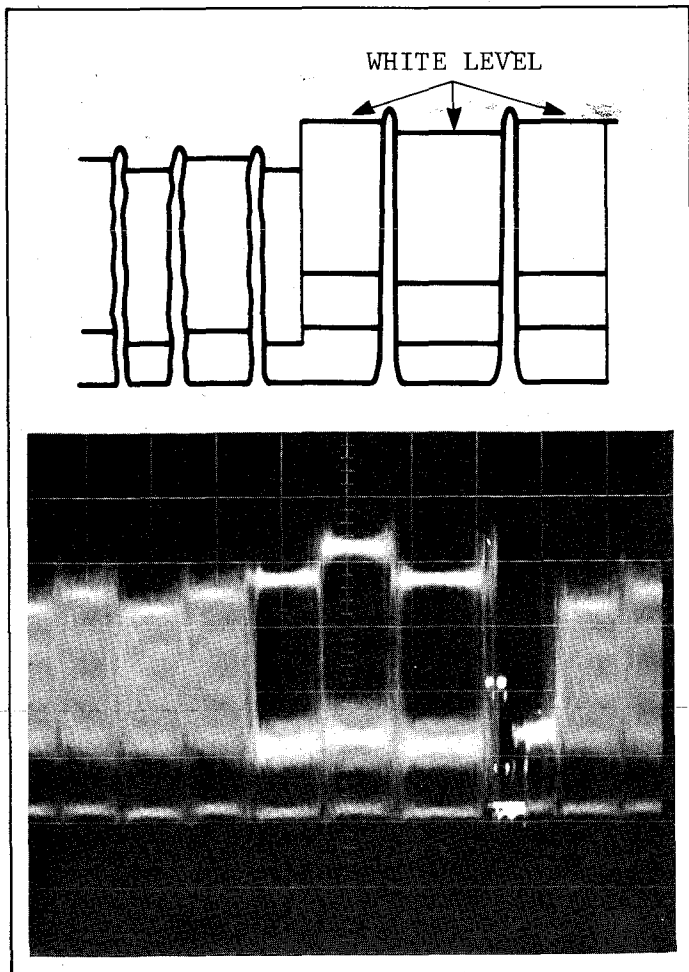


Fig. E35 TP3018 0.5V/2msec. div.

2-4-14. 0.5H Detector (VCO) Adjustment

Test Point: TP3301

Equipment: TV monitor

Adjustment: R3351 (2fH AFC)

1. Supply a video signal to the Video Input on the rear panel or tune in a local TV program.
2. Insert a cassette and make a recording in the LP mode for a few minutes.
3. Playback the portion just recorded and push the CUE button.
4. Connect the DVM to TP3301 on the 1/2 skew compensation section.
5. Adjust the 2fH AFC (R3351) so that the voltage is $2.8 \pm 0.1V$ DC.
6. Confirm that the noise bar on TV monitor is locked.
7. Then, push the REVIEW button and confirm that the noise bar on TV monitor is locked.

2-4-15. 0.5H AFC Adjustment

Test Point: TP8005

Adjustment: R3345 (AFC MUTING)

1. Supply a color bar signal to the Video Input on the rear panel.
2. Insert a cassette and make a recording in the LP mode for the few minutes.
3. Playback the portion just recorded.
4. Connect the scope to TP8005 on the Chrominance section.
5. PUSH the REVIEW button.
6. Adjust the AFC MUTING (R3345) so that the width of AFC error voltage becomes minimum.

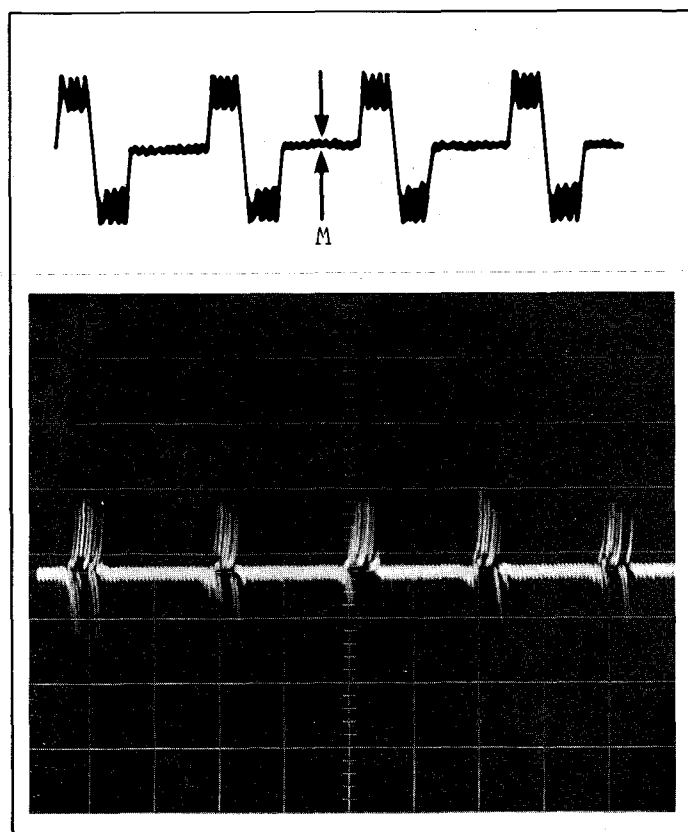
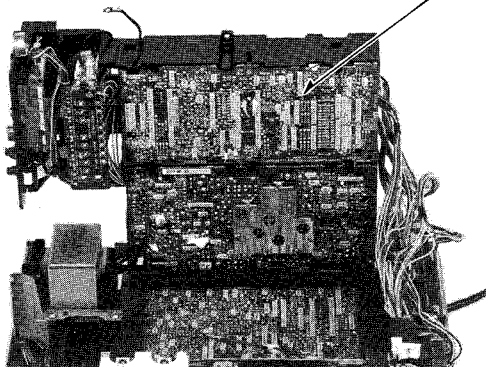


Fig. E36 TP8005 0.2V/1msec. div.

2-5. Programmable Timer Section

Programmable Timer Section



Programmable Timer C.B.A.

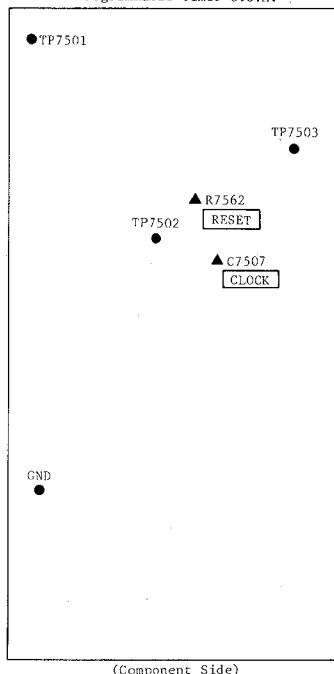


Fig. E37

2-5-1. Clock Adjustment

Test Point: TP7503

Adjustment: C7507 (CLOCK)
(CAUTION)

Since the trimmer C7507 (CLOCK) has already been adjusted critically in factory, do not try to adjust the trimmer except after replacing crystal (X7501) and trimmer (C7505).

2-5-2. Reset Voltage Adjustment

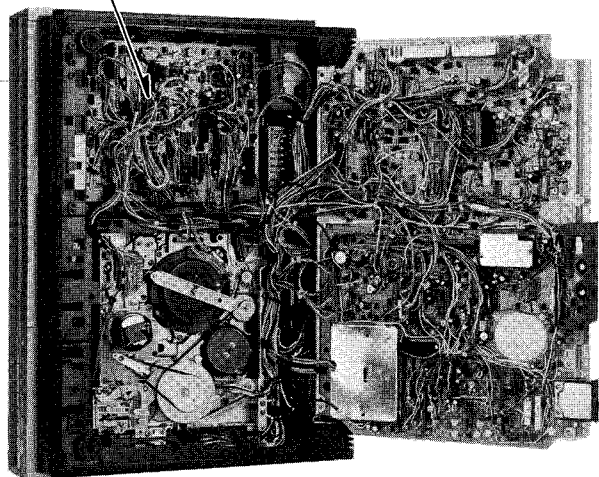
Test Point: TP7502

Adjustment: R7562 (RESET)

2. Disconnect the connectors (P7501 and P7503) from Programmable Timer Board.
3. Connect the DC Power Supply to TP7501 on the same board, and set the voltage to $4.5 \pm 0.05V$ DC.
4. Connect the DVM or scope to TP7502.
5. Turn the RESET (R7562) fully C.C.W. from the component side.
6. Slowly turn the RESET (R7562) C.W. until the voltage on TP7502 drops.
7. Change the voltage at TP7501 of the DC Power Supply to $4.7 \pm 0.05V$.
8. Confirm that the reset action of the unit doesn't operate.
9. Remove the Power Supply connect the connectors (P7601 and P7603).

2-6. System Control Section

System Control Section



System Control C.B.A.

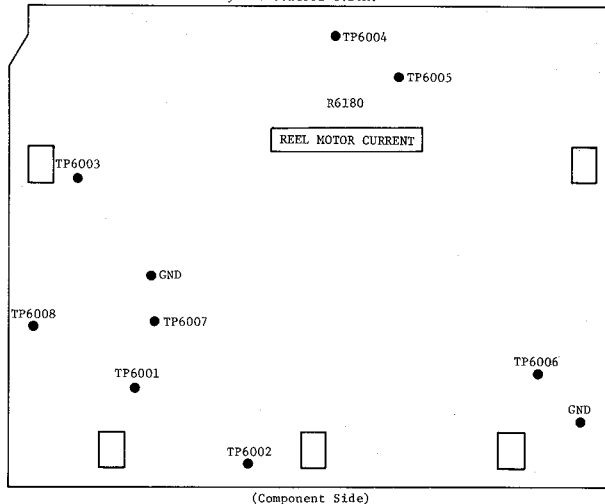


Fig. E38

1. Disconnect the AC plug from the AC Outlet.

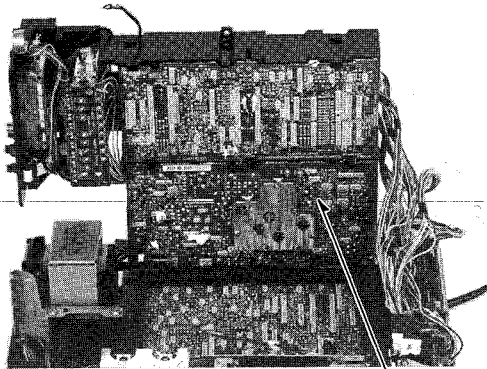
2-6-1. Reel Motor Current Adjustment

Test Point: TP4408

Adjustment: R6180 (REEL MOTOR CURRENT)

1. Connect the DVM between TP4408 (HOT) and TP4407 (GND) on the Audio (II) & DOLBY board.
2. Place the unit in PLAY mode.
3. Adjust the REEL MOTOR CURRENT (R6180) on the System Control board so that the voltage at TP4408 is $170 \pm 5\text{mV}$.
4. Remove the DVM.

2-7. TV Demodulator Section



TV Demodulator Section

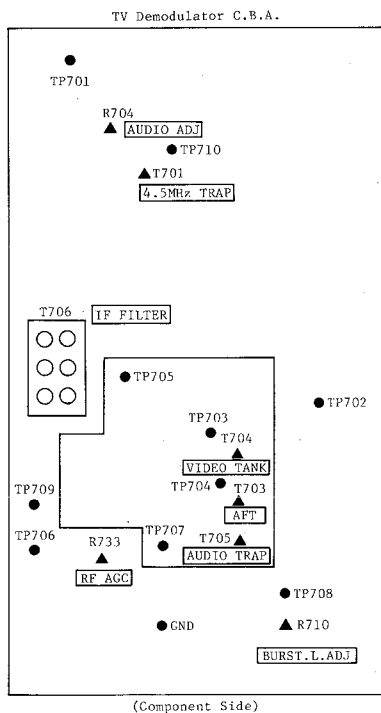


Fig. E39

2-7-1. 45.75MHz Tuning Coil Adjustment

Test Point: TP708

Adjustments: T703 (AFT)

T704 (VIDEO TANK)

1. Connect the VIF Sweep Generator, Trap Adjuster and Monitor Scope are as shown below.

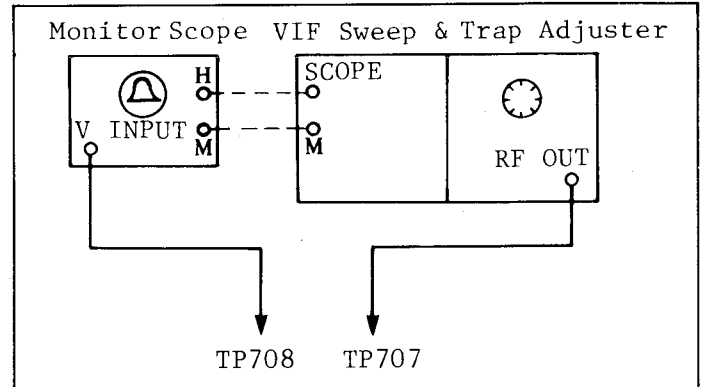


Fig. E40

2. Connect the output of the VIF Sweep Generator to TP707 on the TV Demodulator board.
3. Connect the V Input of the Monitor Scope to TP708 on the same board.
4. Connect the DC Power Supply to TP705 on the same board, and set the voltage of DC Power Supply not to appear noise on waveform (less than 10V DC).
5. Adjust the output of the VIF Sweep Generator so that the level of sweep waveform is 0.1Vp-p at TP708.
6. Remove the core of T703.
7. Adjust the VIDEO TANK (T704) so that the marker portion of 45.75MHz becomes maximum as shown below.

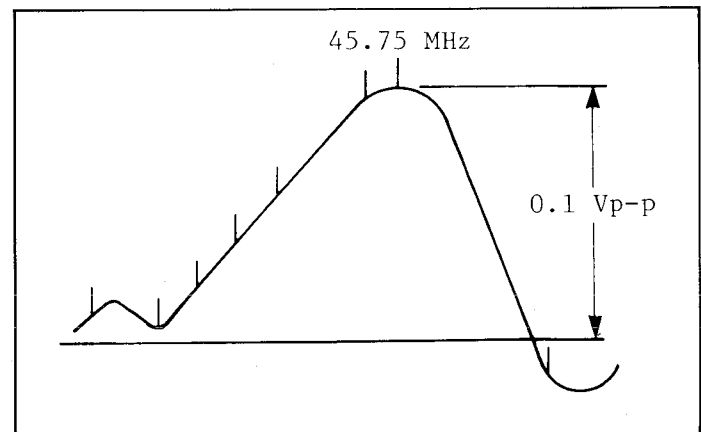


Fig. E41

- After VIDEO TANK (T704) adjustment, adjust AFT (T703) so that the marker portion of the marker 45.75MHz portion is as shown below.

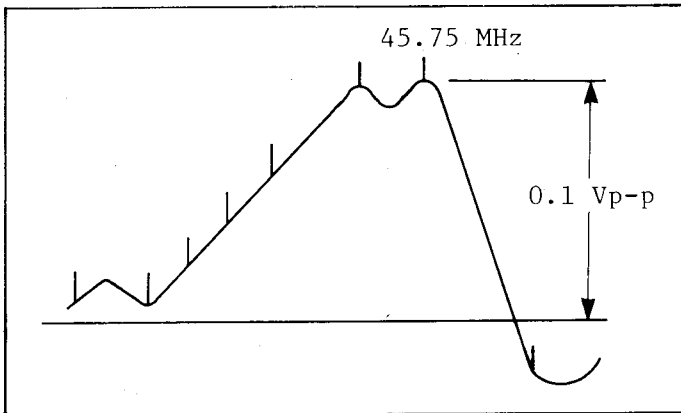


Fig. E42

2-7-2. VIF Overall Adjustment

Test Point: TP708

Adjustments: T705 (AUDIO TRAP)
T706 (IF FILTER)

- Connect the VIF Sweep, Trap Adjuster and Monitor scope are as shown below.

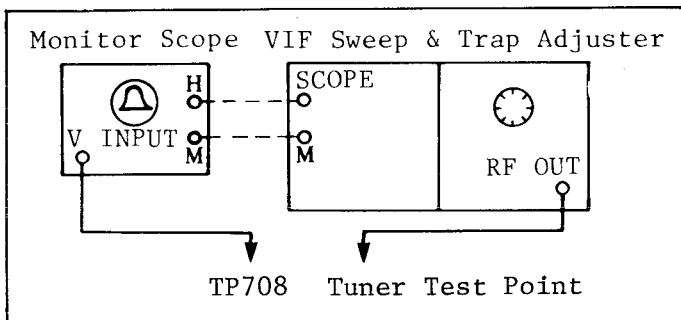


Fig. E43

- Connect the output of the VIF Sweep Generator to tuner test point on the UHF/VHF Tuner unit as shown below.

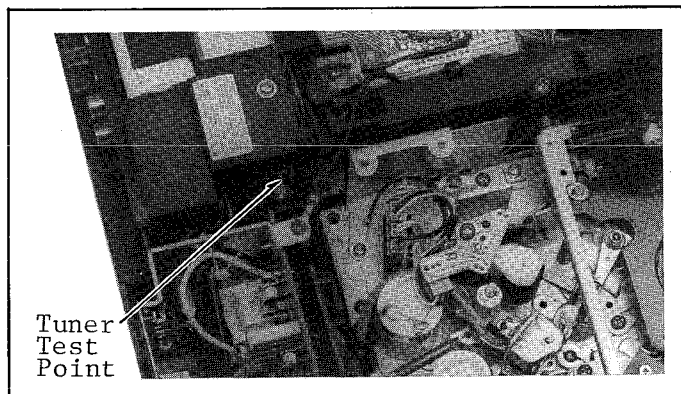


Fig. E44

- Connect the V Input of the Monitor scope to TP708 on the TV Demodulator board.
- Set the tuning control is 13ch.
- Connect the jumper between TP703 and TP704 through a resistor 100Ω.
- Connect a jumper between TP709 and GND. Set the Attenuator on the VIF Sweep Generator to -25dB.
- Connect the DC Power Supply to TP705, and set the voltage so that the A level becomes maximum. (Less than 10V DC)
- Adjust the output of the VIF Sweep Generator so that the A level is 1.0Vp-p.

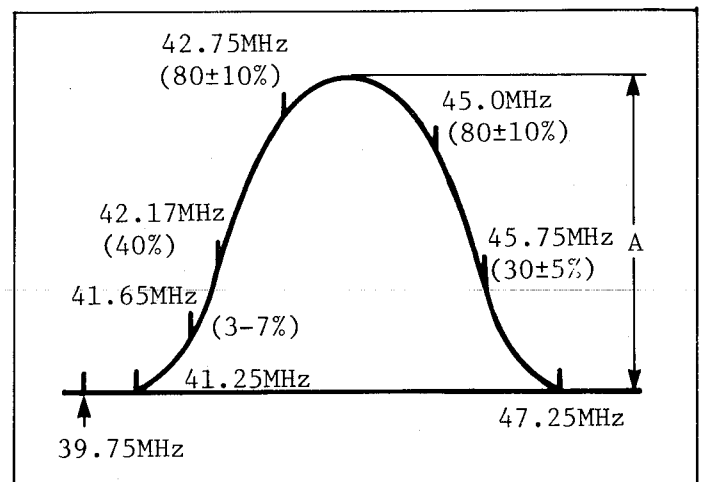


Fig. E45

- Increase the VIF Sweep Generator output by 25dB.
- Adjust the DC Power Supply so that the A portion becomes 1.0Vp-p.
- Set the 41.25MHz Trap (X) on the VIF Sweep Generator.
- Adjust the AUDIO TRAP (T705) so that the 41.25MHz trap (X) becomes minimum.

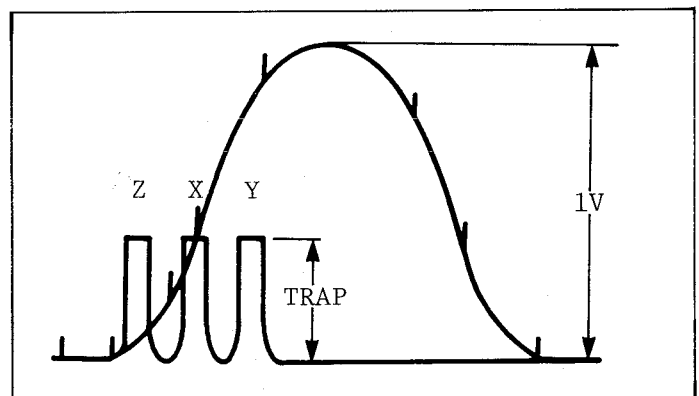


Fig. E46

13. Set the 47.25MHz Trap (Y) on the VIF Sweep Generator.
14. Adjust the IF FILTER (T706)-(1) so that the 47.25MHz trap (Y) becomes minimum.

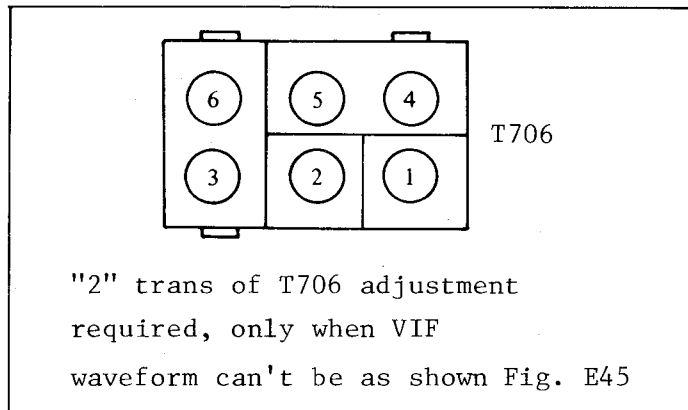


Fig. E47

15. Set the 39.75MHz Trap (Z) on the VIF Sweep Generator.
16. Adjust the IF FILTER (T706)-(2) so that the 39.75MHz trap (Z) becomes minimum.
17. Adjust the tuner converter coil (L33) on the VHF/UHF tuner unit and (3), (4), (5) and (6) trans of T706 so that the sweep output waveform becomes as shown Fig. E45.

2-7-3. AFC Trans Adjustment

Test Point: Tuner Test Point

Adjustment: T703 (AFT)

1. Tune in a local TV program.
(Using Channel 4)
2. Connect the frequency counter to tuner test point on the UHF/VHF Tuner unit.
3. Set the AFT switch on the preset panel is "OFF".
4. Adjust the tuning control so that the frequency is $113.0 \pm 0.01\text{MHz}$.
5. Set the AFT switch on the preset panel is "ON".
6. Adjust the AFT (T703) so that the frequency at the tuner test point becomes $113.0 \pm 0.005\text{MHz}$.

2-7-4. Burst Level Adjustment

Test Point: TP702

Adjustment: R710 (BURST LEVEL)

1. Supply the NTSC standard color bar signal to the RF input on the rear panel and tune this signal.

2. Connect the scope to TP702 on the TV Demodulator board.
3. Confirm that the video level at TP702 is $1.0 \pm 0.2\text{Vp-p}$.
4. Adjust the BURST LEVEL (R710) so that the burst level is $22\% \pm 1\%$ of video level.
5. Confirm that the sync level is more than 24% of video level.

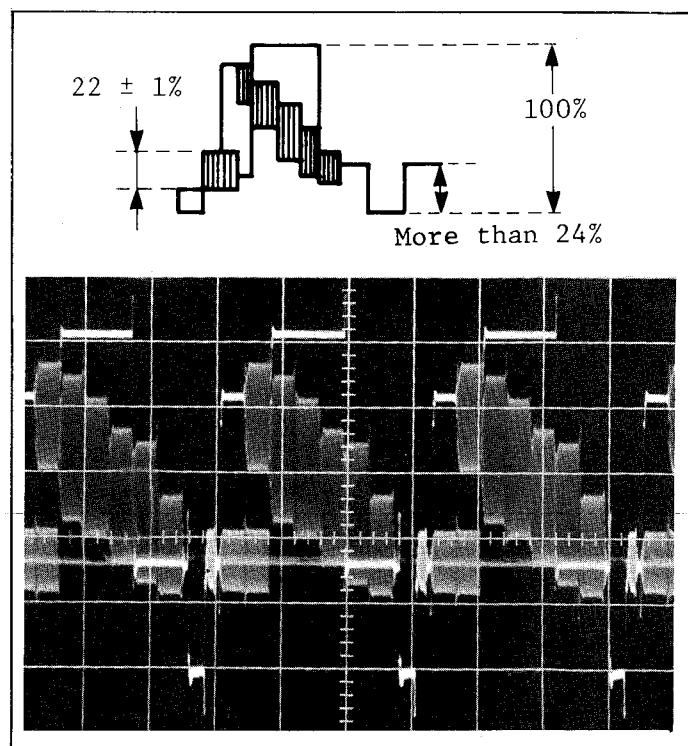


Fig. E48 TP702 0.2V/20μsec. div.

2-7-5. SIF Input Trans Adjustment

Test Point: TP710

Adjustment: T701 (4.5MHz TRAP)

1. Tune in a local TV program.
(Using free channel)
2. Connect the scope to TP710 on the TV Demodulator board.
3. Adjust the 4.5MHz TRAP (T701) so that the V level is maximum.

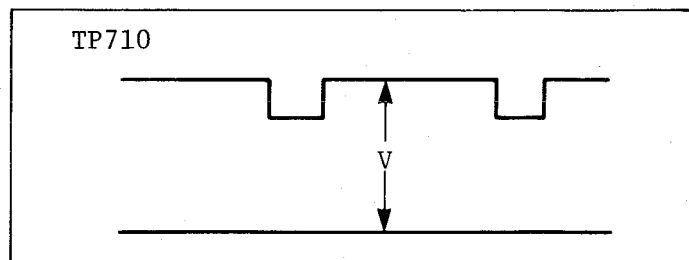


Fig. E49

2-7-6. Audio Level Adjustment

- Test Point: TP701
Adjustment: R704 (AUDIO LEVEL)
1. Supply a audio signal of 400Hz with 30% modulated frequency to the RF input on the rear panel. (Using the TV Channel Signal Generator)
 2. Connect the scope between TP701 and GND.
 3. Adjust the AUDIO LEVEL (R704) so that the level is 133 +2, -30mVp-p.

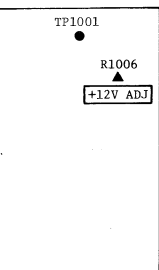
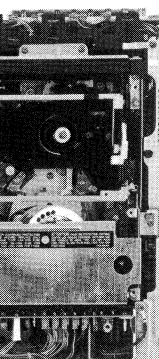
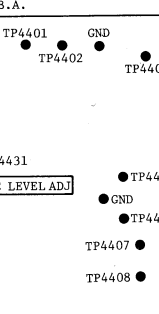
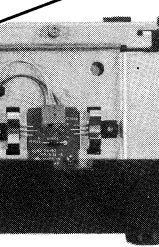
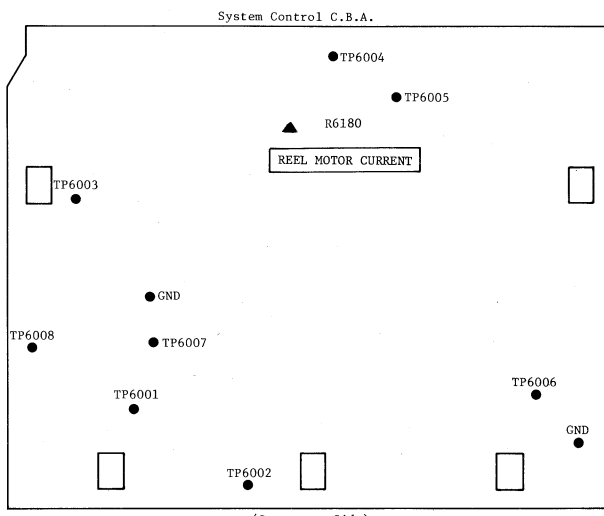
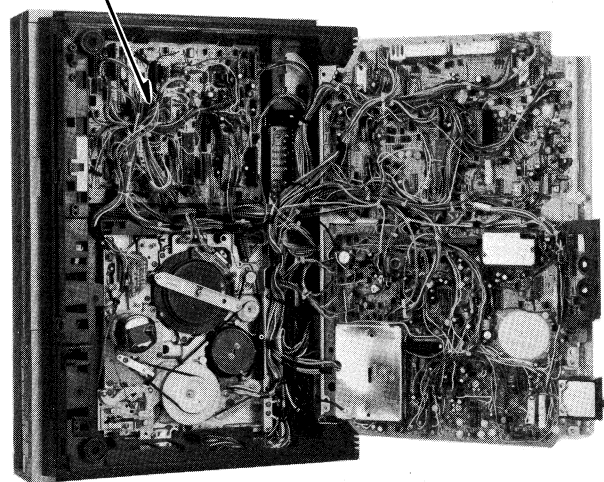
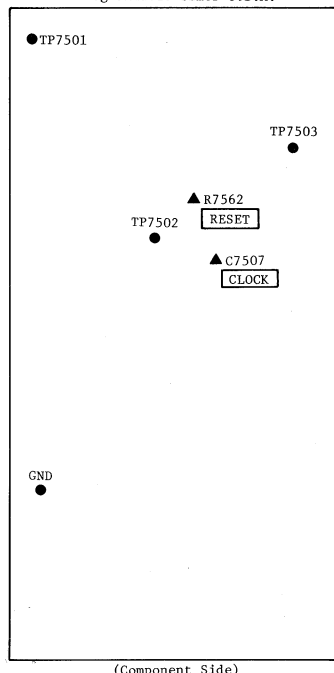
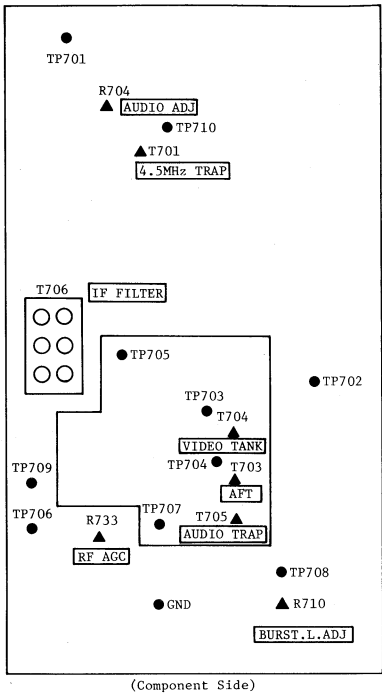
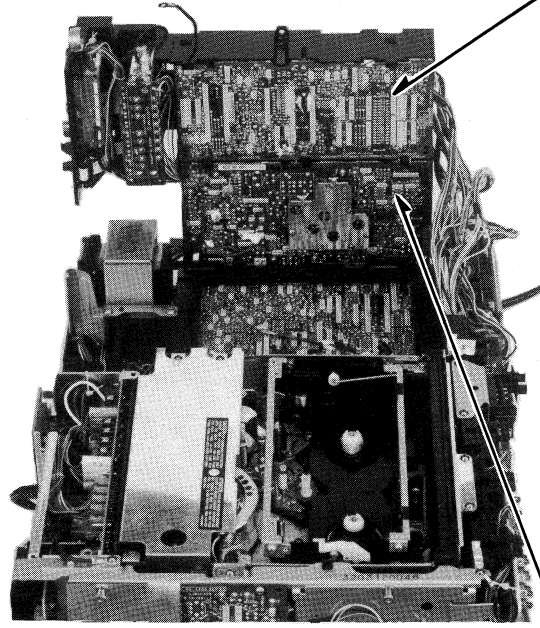
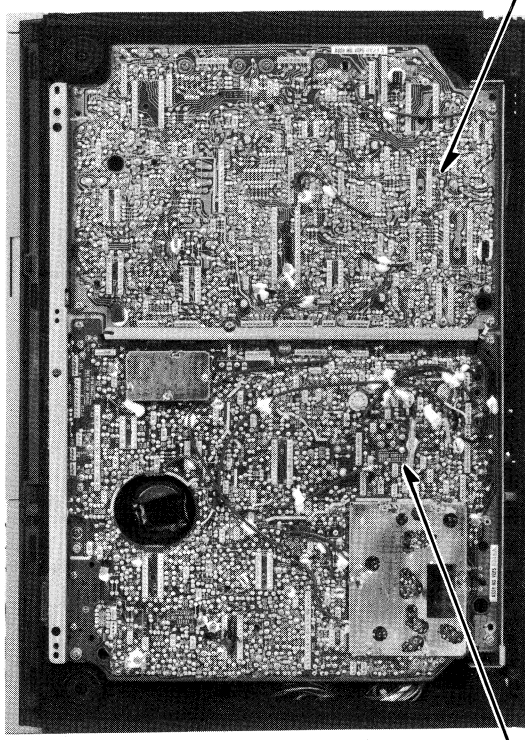
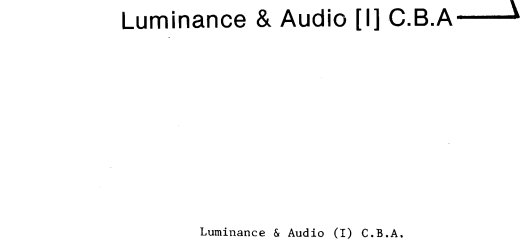
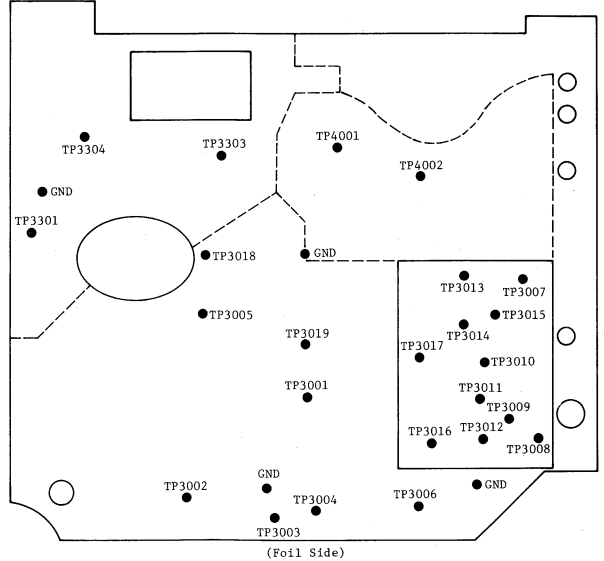
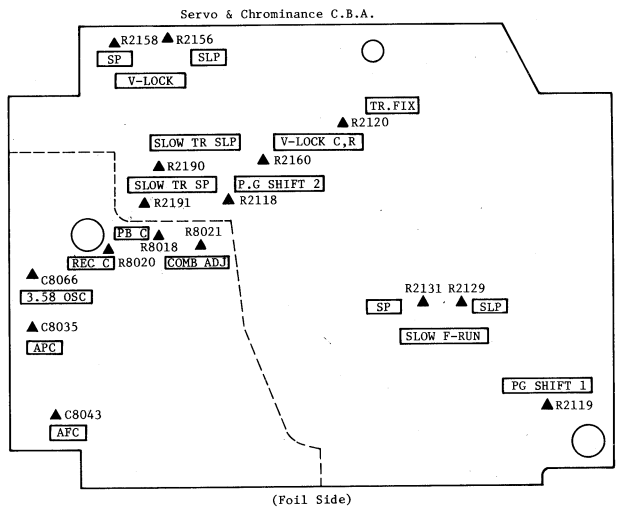
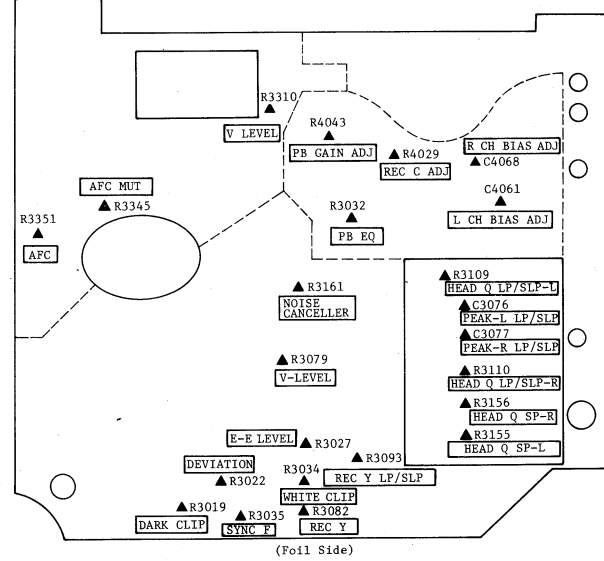
2-7-7. RF AGC Adjustment

- Test Point: TP709
Adjustment: R733 (RF AGC)
1. Turn in a color bar signal (VHF).
 2. Set the AFT switch to "ON" position.
 3. Set the input level of electric field to $65 \pm 2\text{dB}\mu$. (Using the Attenuator and Spectrum Analyzer)
 4. Connect the scope to TP709 on the TV Demodulator board.
 5. Tune the RF AGC (R733) fully counterclockwise from the component side.
 6. Then slowly turn the RF AGC (R733) till just before the voltage drops.
 7. Change the input electric field from $65\text{dB}\mu$ to $68\text{dB}\mu$.
 8. Confirm that the voltage at TP709 is dropped more than 1.0V.

Location of Test Points and Controls

Power Supply C.B.A	System Control C.B.A	Programmable Timer C.B.A/ TV Demodulator C.B.A	Serv
VEPS0124A	VEPS0650A	VEPS0653A/VEPS0745A1	
<div><p>Power Supply C.B.A.</p><p>(Component Side)</p><p>Power Supply C.B.A</p></div>	<div><p>System Control C.B.A.</p><p>(Component Side)</p><p>System Control C.B.A</p></div>	<div><p>Programmable Timer C.B.A.</p><p>(Component Side)</p><p>TV Demodulator C.B.A.</p><p>(Component Side)</p><p>Programmable Timer C.B.A</p><p>TV Demodulator C.B.A</p></div>	<div><p>S</p></div>
Audio [II] & Dolby C.B.A			
VEPS0409A			
<div><p>Audio [II] & DOLBY C.B.A.</p><p>(Foil Side)</p><p>Audio [II] & Dolby C.B.A</p></div>	<div><p>System Control C.B.A</p></div>		<div><p>TP3304</p><p>GND</p><p>TP3301</p></div>

Location of Test Points and Controls

C.B.A	System Control C.B.A	Programmable Timer C.B.A/ TV Demodulator C.B.A	Servo & Chrominance C.B.A/Luminance & Audio [I] C.B.A
	VEPS0650A	VEPS0653A/VEPS0745A1	VEPS0228A/VEPS0318B
   	 <p>(Component Side)</p>  <p>System Control C.B.A</p>	 <p>(Component Side)</p>  <p>(Component Side)</p>  <p>Programmable Timer C.B.A</p> <p>TV Demodulator C.B.A</p>	 <p>Servo & Chrominance C.B.A</p>  <p>Luminance & Audio [I] C.B.A</p>  <p>(Foil Side)</p>  <p>(Foil Side)</p>  <p>(Foil Side)</p>

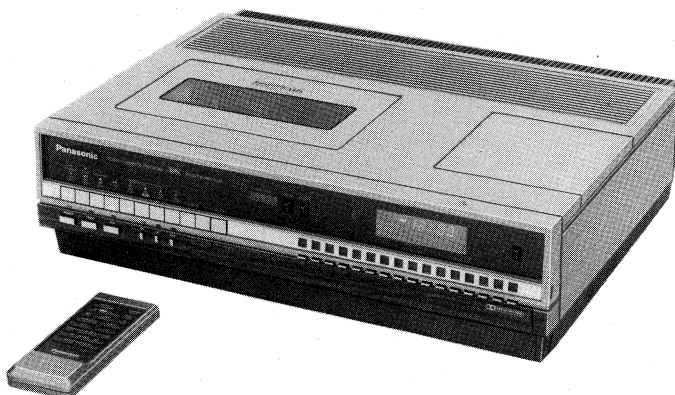
Memo

Service Manual

Video Cassette Recorder

Panasonic
 Omnivision **VHS**
PV-1780
Vol. 3

Block Diagrams



SPECIFICATIONS

Power Source: 120V AC $\pm 10\%$, 60 Hz $\pm 0.5\%$
 Power Consumption: Approx. 47 watts
 Television System: EIA Standard (525 lines, 60 fields)
 NTSC color signal

Video Recording

System: 4 rotary heads helical scanning system
 Luminance: FM azimuth recording
 Chrominance: Converted subcarrier phase shift recording

Audio Track: 2 track
 Tape Format: Tape width 1/2" (12.7 mm), high density tape

Tape Speed: SP mode: 1-5/16 i.p.s (33.35 mm/s)
 LP mode: 21/32 i.p.s (16.67 mm/s)
 SLP mode: 7/16 i.p.s (11.12 mm/s)

Record/Playback Time: 360 min. with NV-120 used in SLP mode

FF/REW Time: Less than 6 min with NV-T120

Heads: Video: 4 rotary heads
 Audio: 2 stationary heads/
 Control: 1 stationary head
 Erase: 1 full track erase
 1 audio track erase for audio dubbing

Input Level: Video: Video IN Jack (RCA type)
 1.0Vp-p, 75 Ω unbalanced
 Audio: MIC IN Jack (Right, left)
 -70dB, 4k Ω unbalanced
 Audio IN Jack (RCA type)
 -20dB, 100k Ω unbalanced

TV Tuners: VHF Input: Ch2-Ch3,
 cable channels "A"-"W"
 75 Ω unbalanced
 UHF Input: UHF Ch14-Ch83,
 300 Ω balanced

Output Level: Video: Video OUT Jack (RCA type)
 1.0Vp-p, 75 Ω unbalanced
 Audio: Audio OUT Jack (RCA type)
 (Right, left)
 -9dB, 600 Ω unbalanced

RF Modulated: Channel 3 or 4
 72dB μ , (Open voltage)
 75 Ω unbalanced

Video Horizontal

Resolution: Color: more than 230 lines
 B/W: more than 270 lines

Audio Frequency

Response: SP mode: 100Hz ~ 8kHz
 LP mode: 100Hz ~ 6kHz
 SLP mode: 150Hz ~ 5kHz (10dB down)

Signal-to-Noise Ratio: Video: better than 40dB
 (Rohde & Schwarz noise meter)
 Audio: SP mode: better than 42dB
 LP mode: better than 40dB
 SLP mode: better than 40dB
 (Dolby NR ON)

Operation

Temperature: 41°F-104°F (5°C-40°C)

Operating Humidity: 10%-75%

Weight: 25.3 lbs (11.5 kg)

Dimensions: 18-7/8"(W) \times 14-1/4"(D) \times 5-3/8"(H)
 (480 mm \times 356 mm \times 136 mm)

Accessories Supplied:

- Blank tape
- Wireless remote control unit
- 75 Ω -300 Ω matching transformer
- 300 Ω -75 Ω matching transformer
- Coaxial cable (5ft) with F type connectors
- Twin lead wire (5ft)
- Dust cover
- Vertical-Lock tool

Available Tapes:

1/2" VHS video cassette tapes
 NV-T120 Approx. 810ft. (247m),
 2, 4 or 6 hrs.
 NV-T60 Approx. 417ft. (127m),
 1, 2 or 3 hrs.

Weight and dimensions shown are approximate. Specifications are subject to change without notice.

Panasonic®

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 Division of Matsushita Electric
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 One Panasonic Way, Secaucus,
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 Ontario, L4W 2T3

Panasonic Sales Company,
 Division of Matsushita Electric
 of Puerto Rico, Inc.
 Ave. 65 De Infantería, KM 9.7
 Victoria Industrial Park
 Carolina, Puerto Rico 00630

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ABBREVIATIONS

ACC	: Automatic Color Gain Control	LPF	: Low Pass Filter
AFC	: Automatic Frequency Control	MMV	: Monostable Multi Vibrator
AGC	: Automatic Gain Control	OSC	: Oscillator
AMP	: Amplifier	PWM	: Pulse Width Modulation
APC	: Automatic Phase Control	SEP	: Separator
BPF	: Band Pass Filter	VCO	: Voltage Controlled Oscillator
DIFF AMP	: Differential Amplifier	VSS	: Vertical Sync Signal
DOC	: Drop Out Compensation	VXO	: Voltage Controlled Crystal Oscillator
FF	: Flip Flop		
HPF	: High Pass Filter		

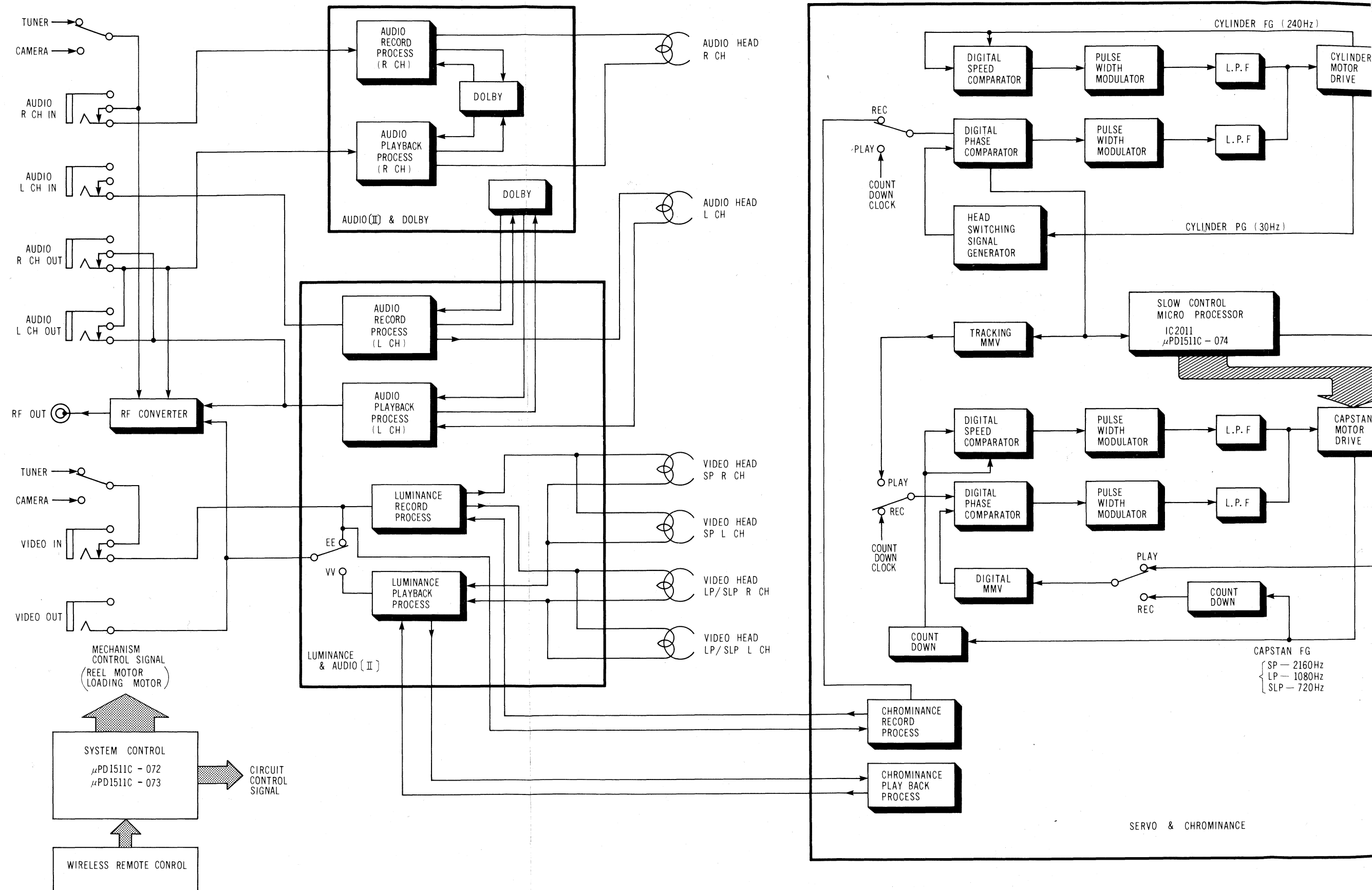
NOTICE

In order to operate the unit without a tape, make the following connections.

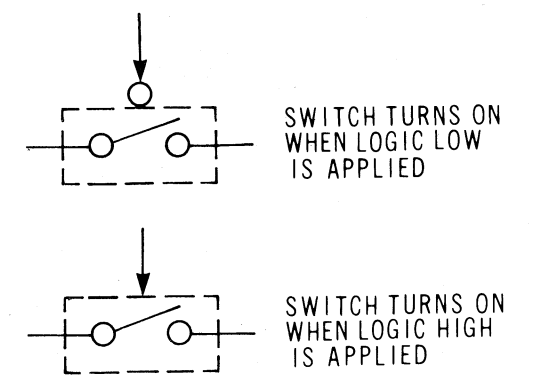
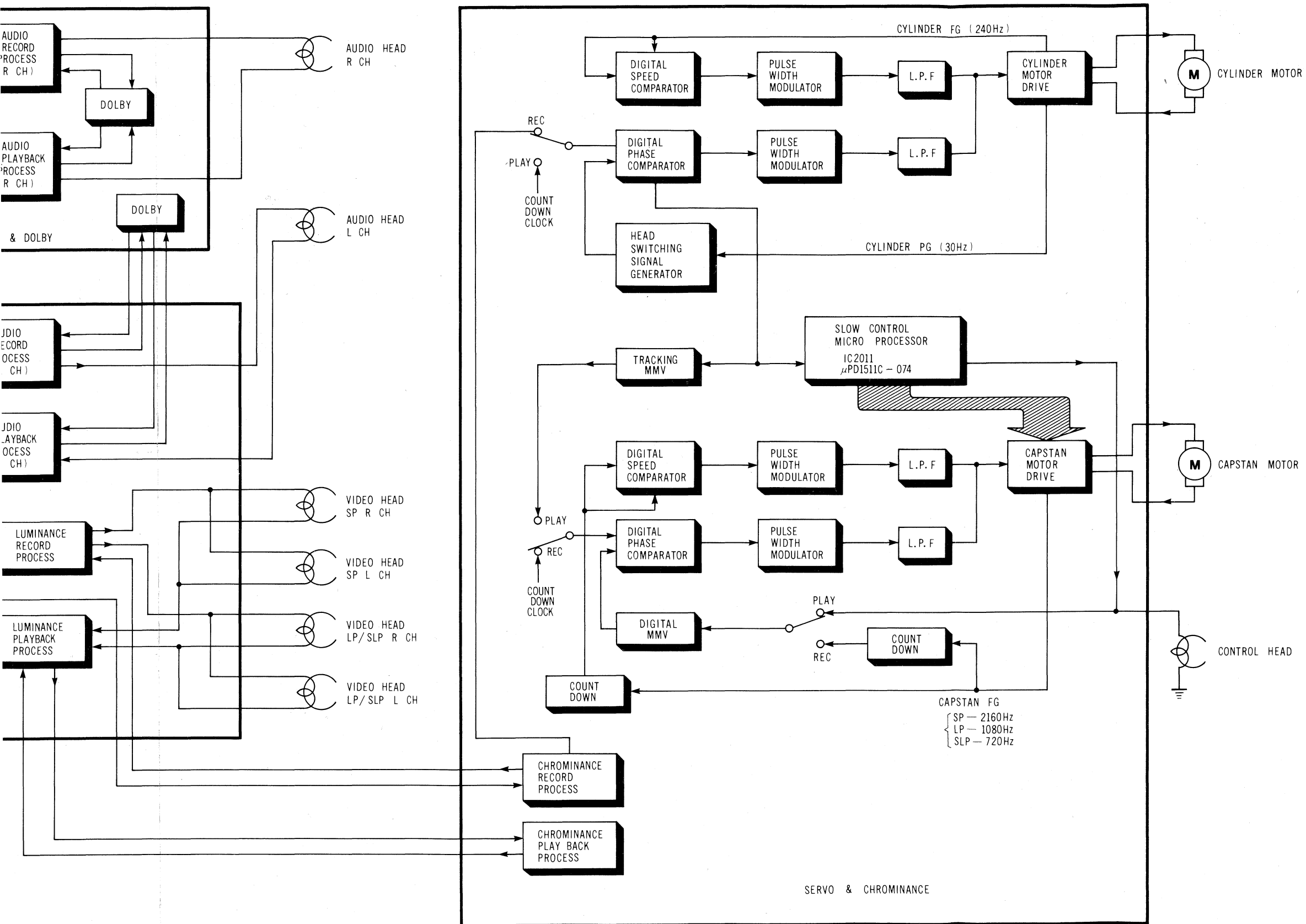
- 1) Connect a jumper between TP6002 and TP6003.
- 2) Connect a jumper between TP6001 and Ground.

Above three test points are located on the System Control board.

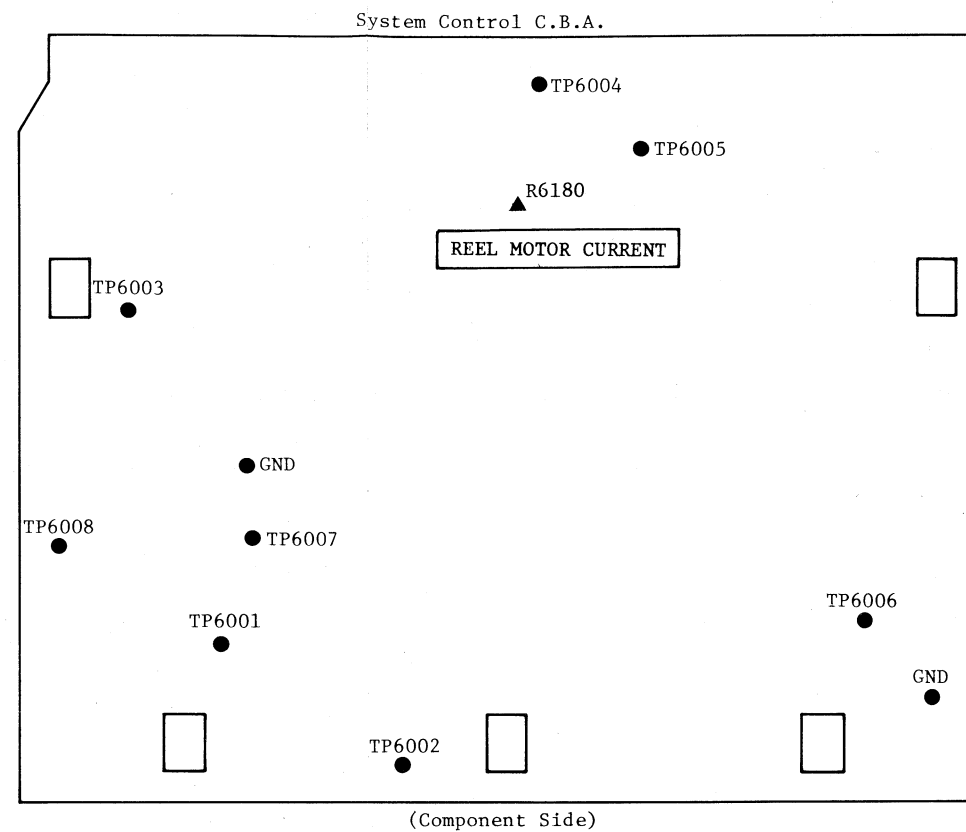
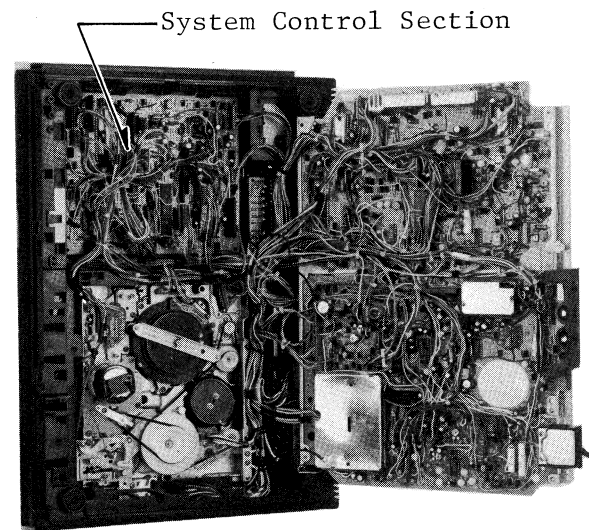
OVERALL BLOCK DIAGRAM



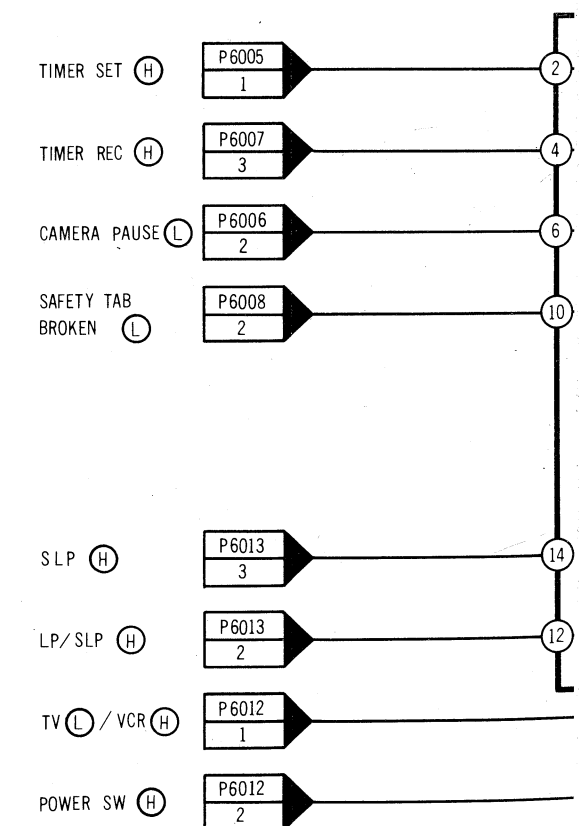
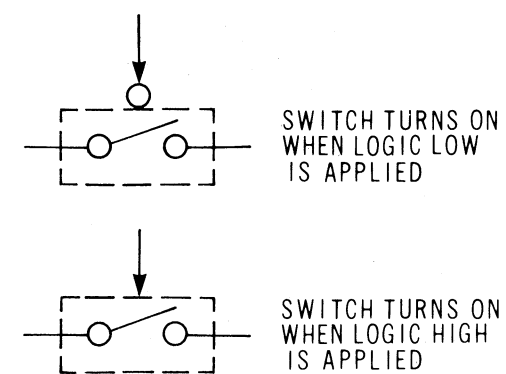
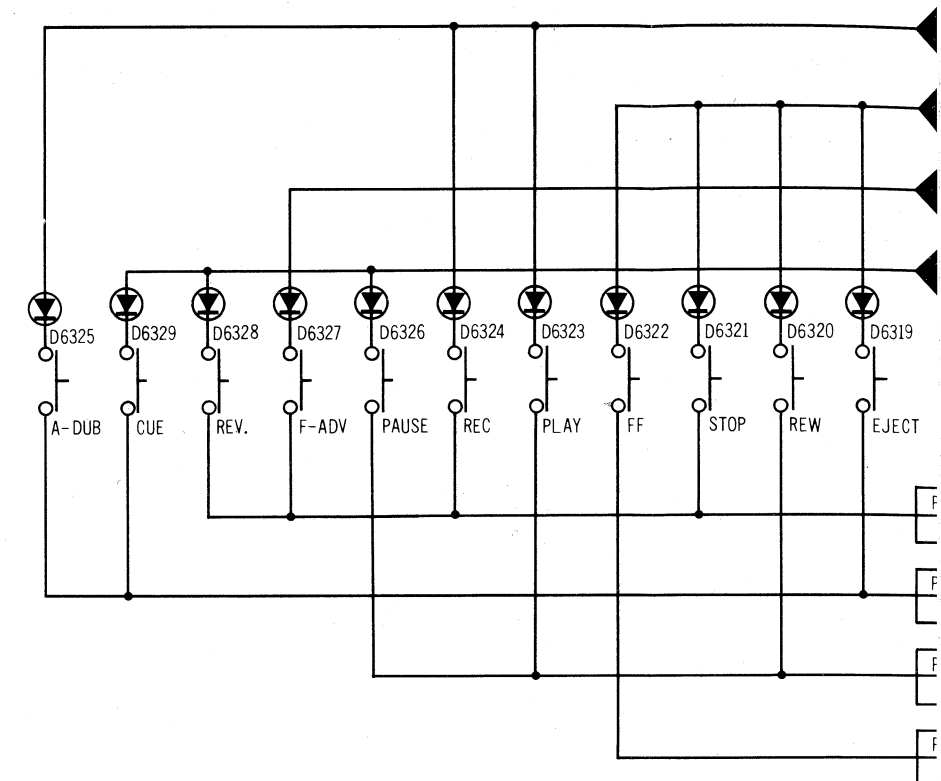
3-1
OVERALL
BLOCK DIAGRAM



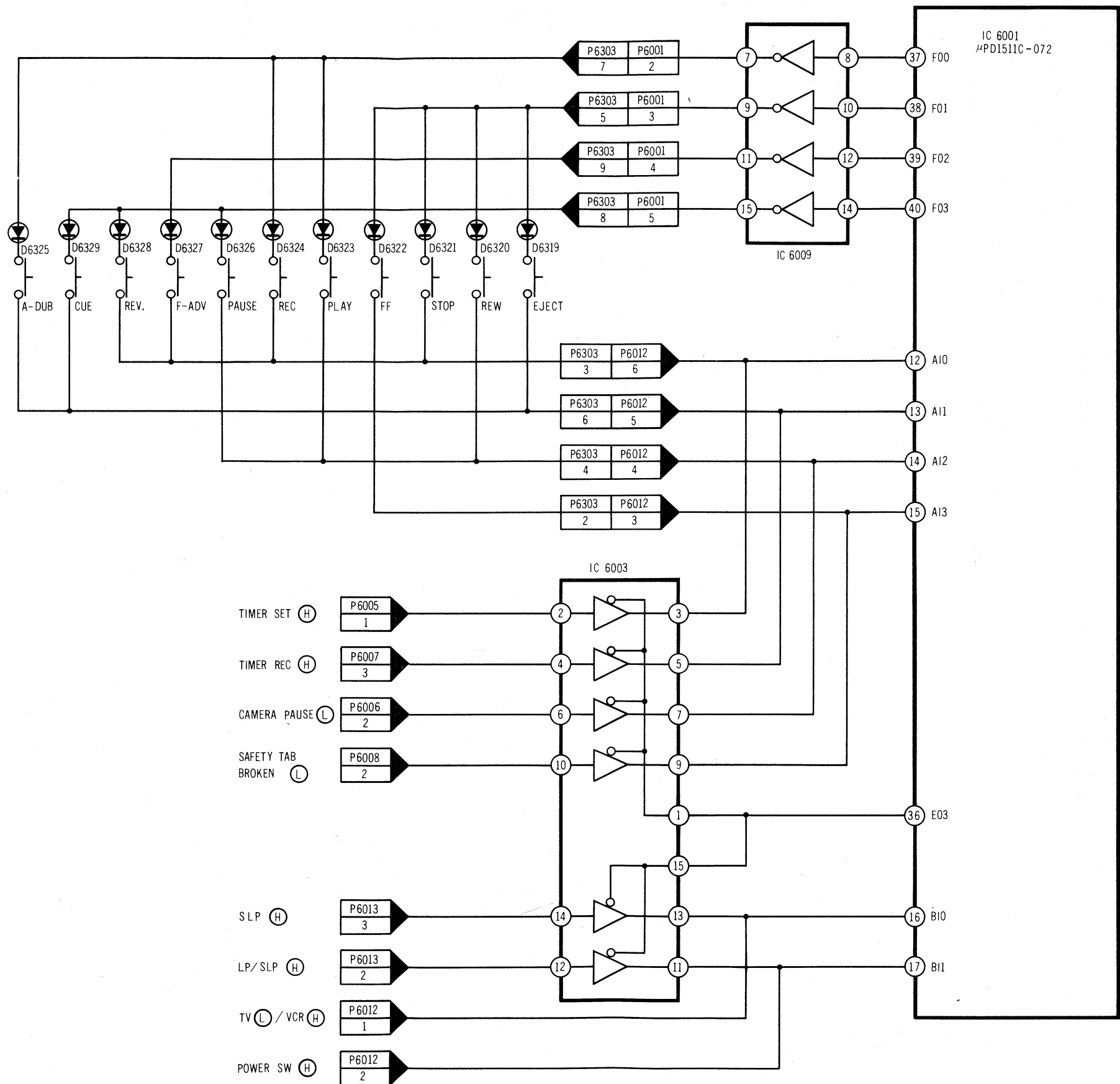
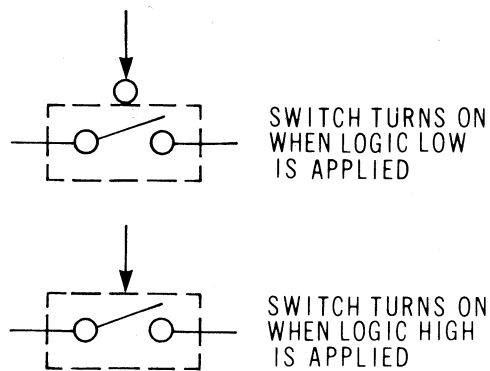
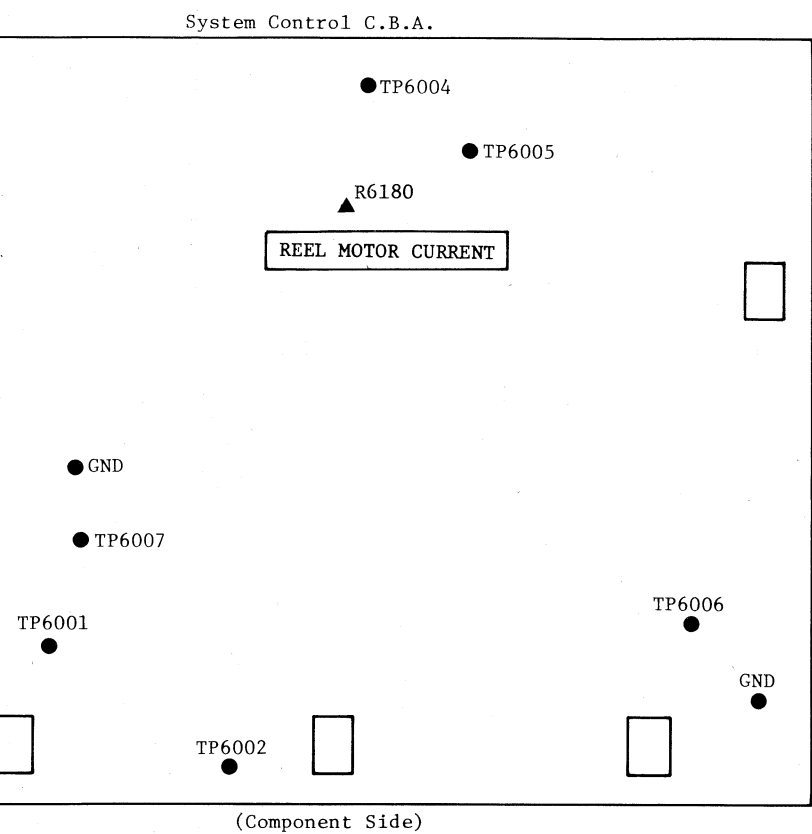
3-2
KEY MATRIX
BLOCK DIAGRAM



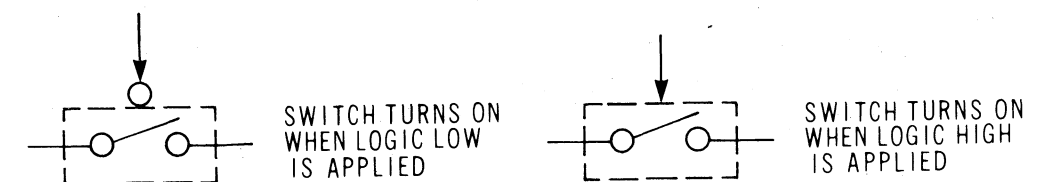
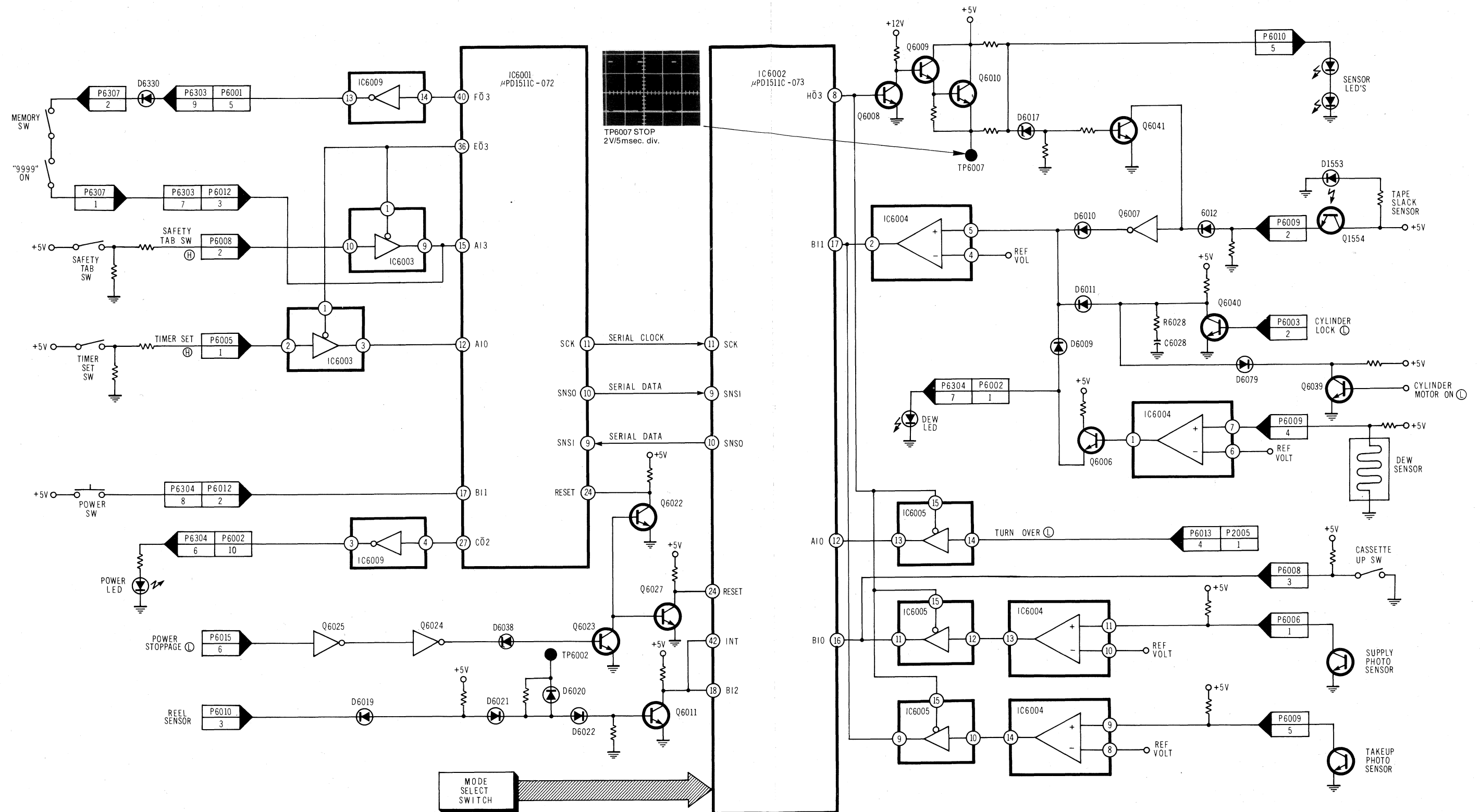
KEY MATRIX BLOCK DIAGRAM (SYS



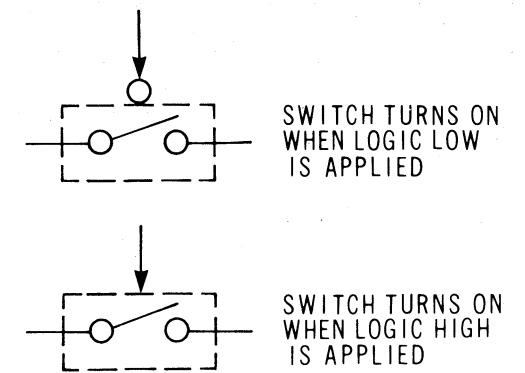
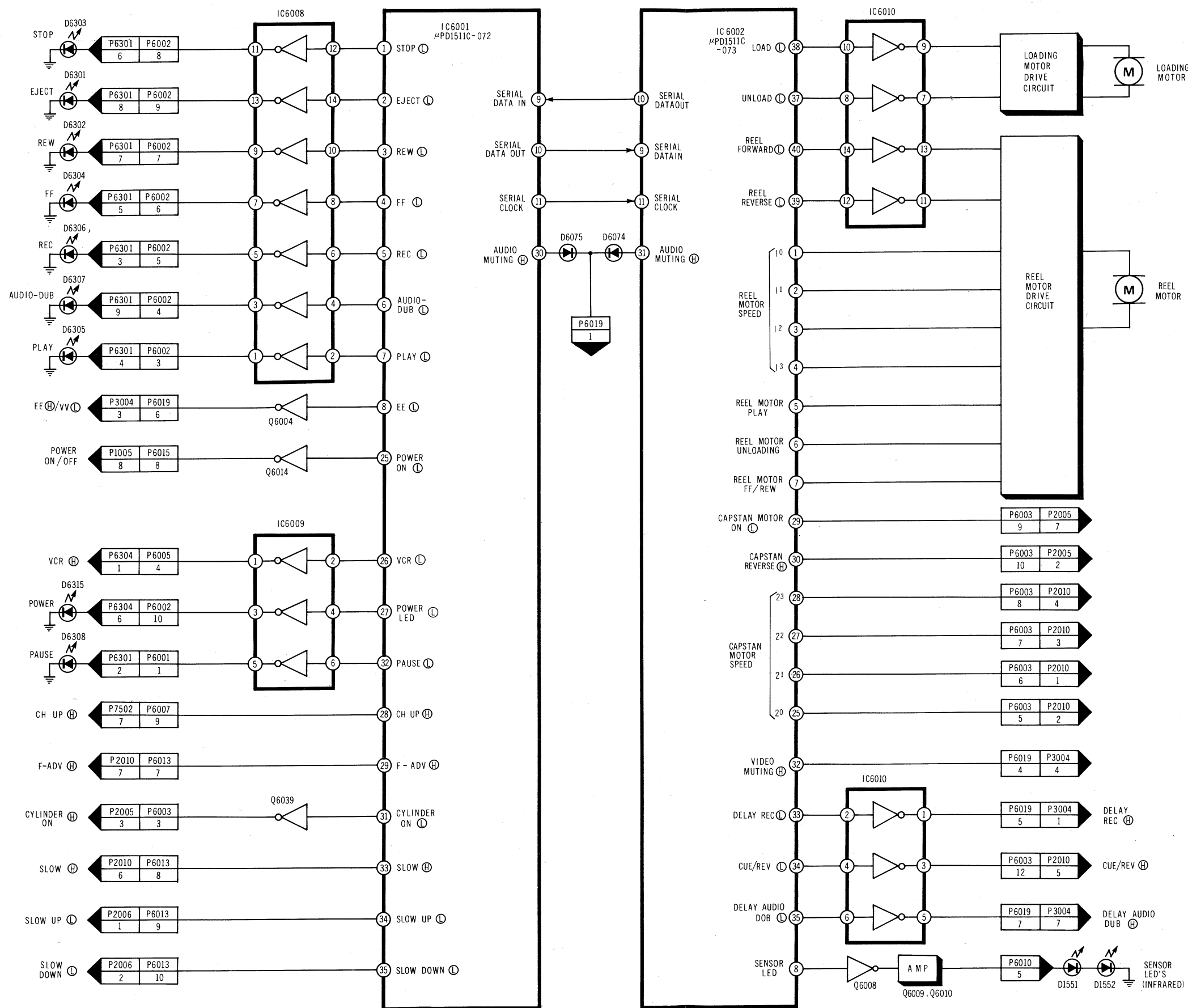
KEY MATRIX BLOCK DIAGRAM (SYSTEM CONTROL)



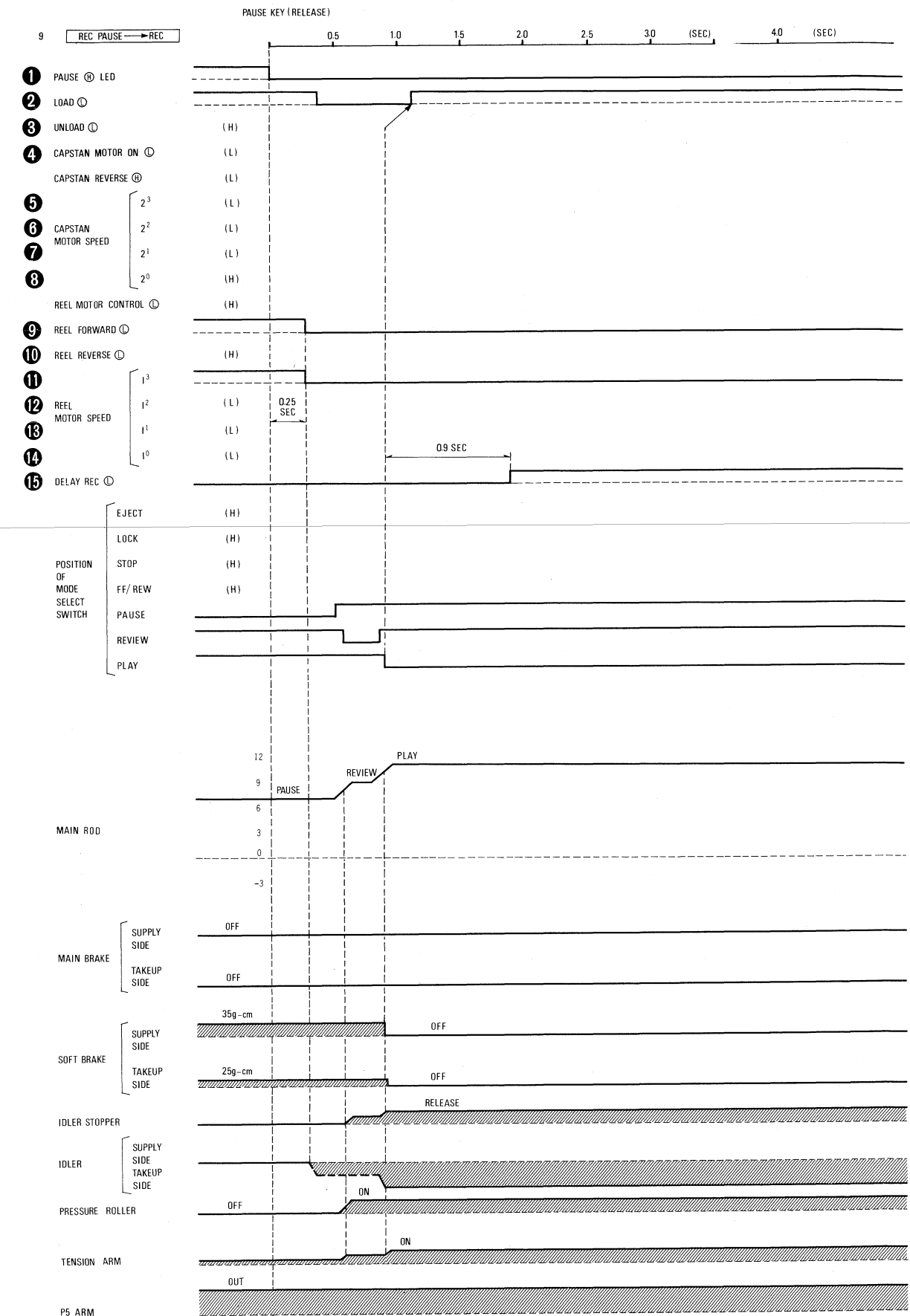
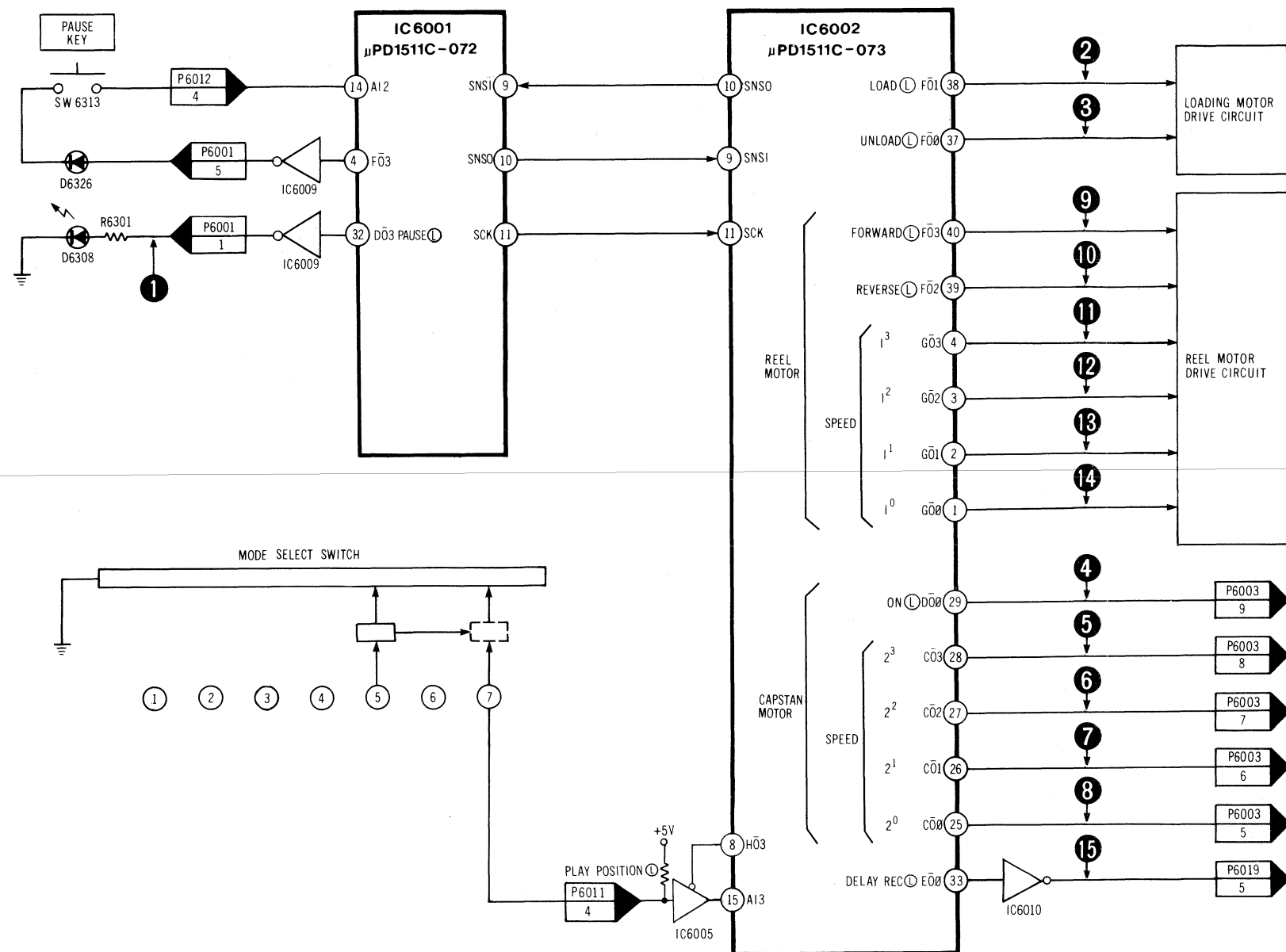
SAFETY DEVICE BLOCK DIAGRAM (SYSTEM CONTROL)



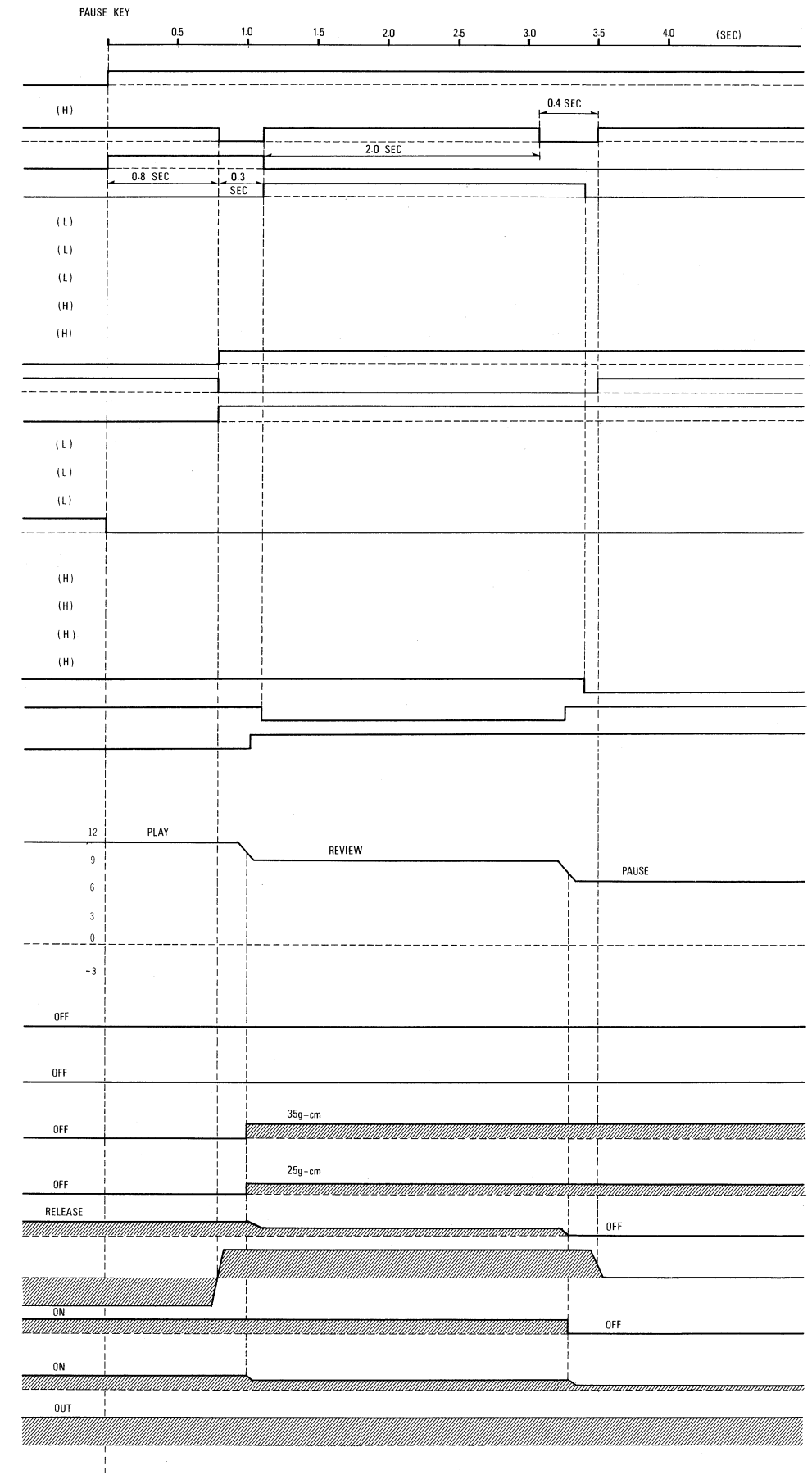
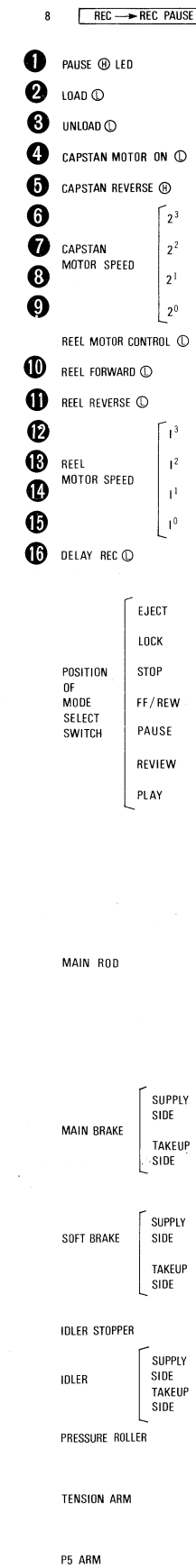
DRIVE SIGNAL BLOCK DIAGRAM (SYSTEM CONTROL)



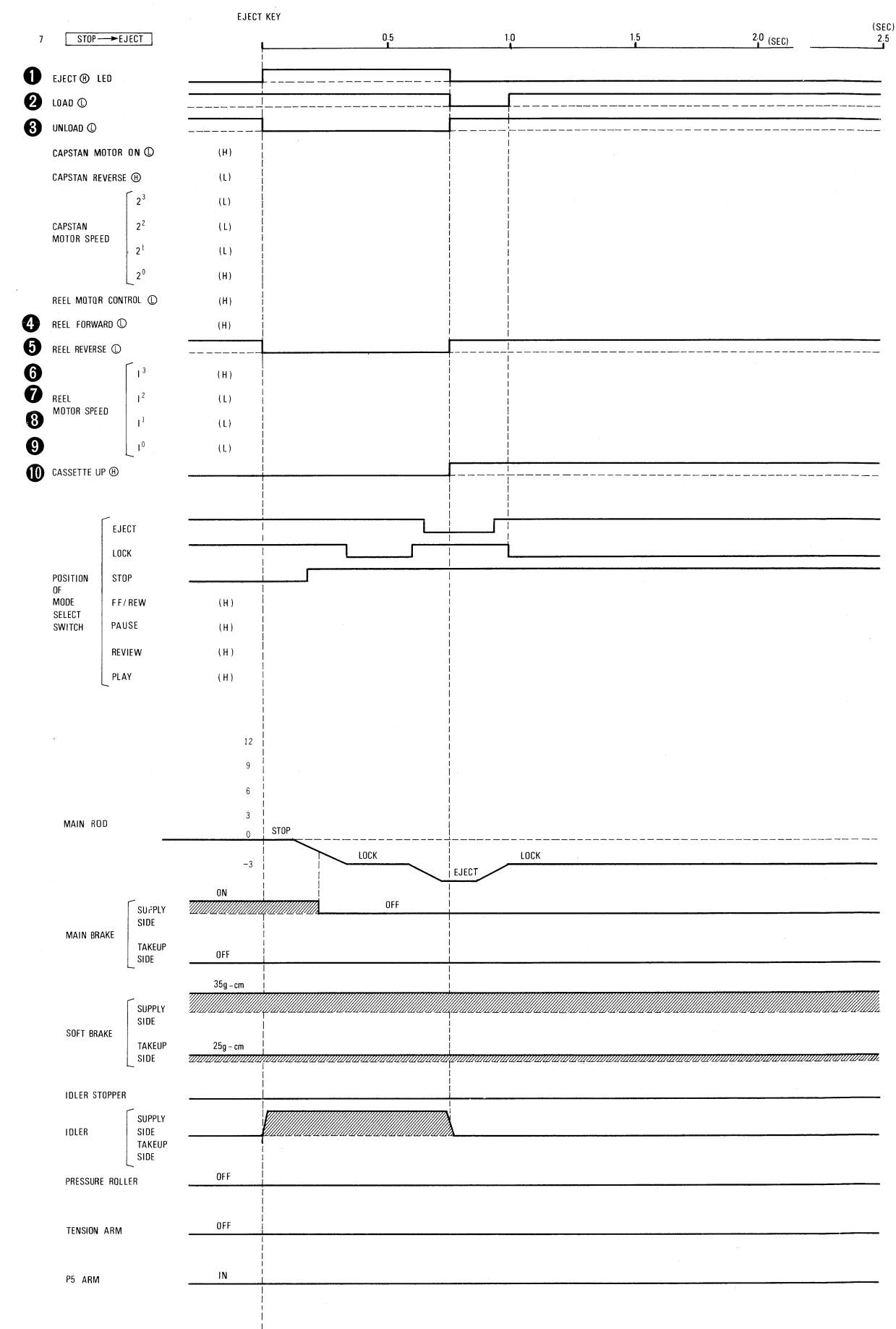
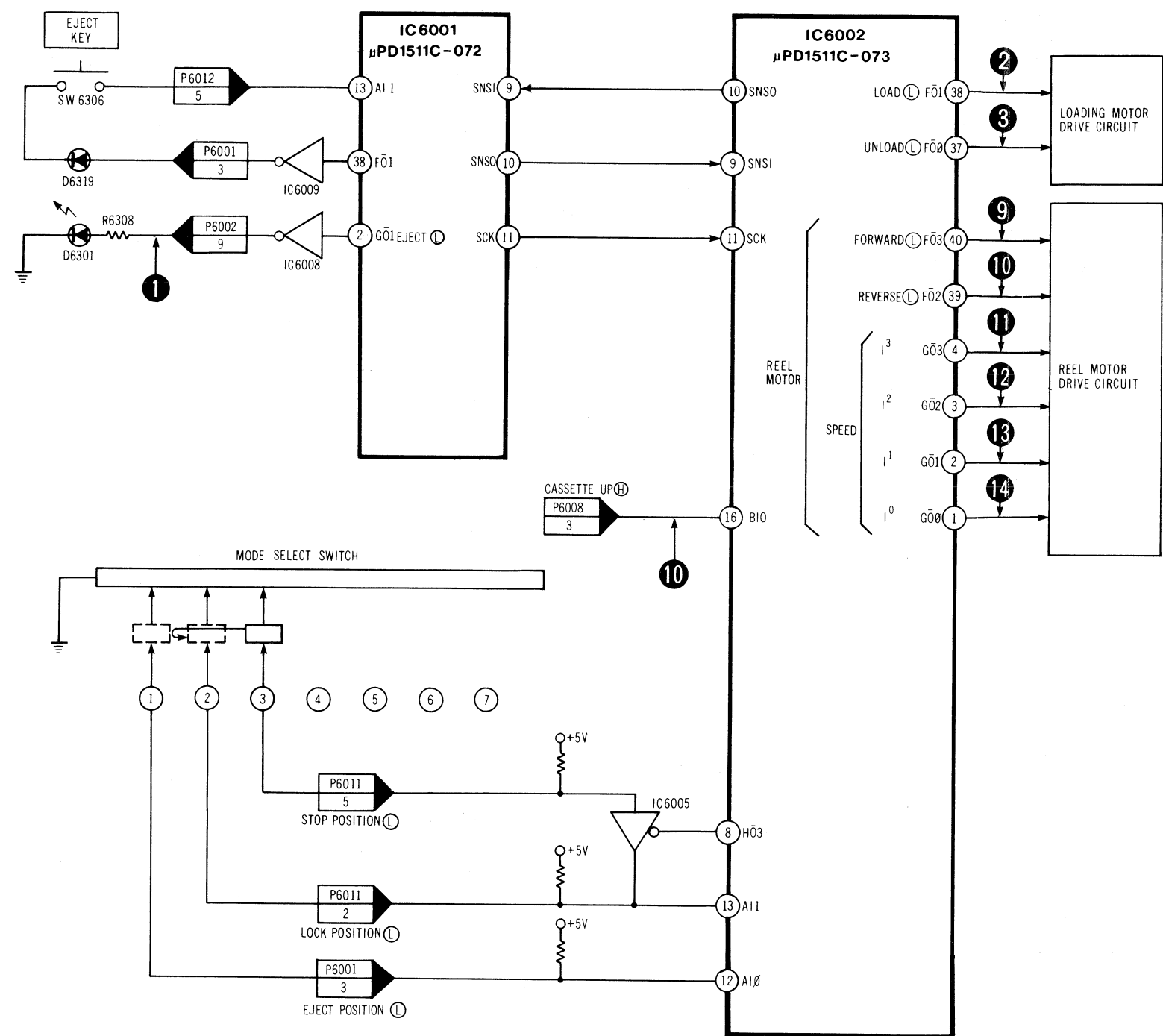
REC • PAUSE → REC BLOCK DIAGRAM (SYSTEM CONTROL)



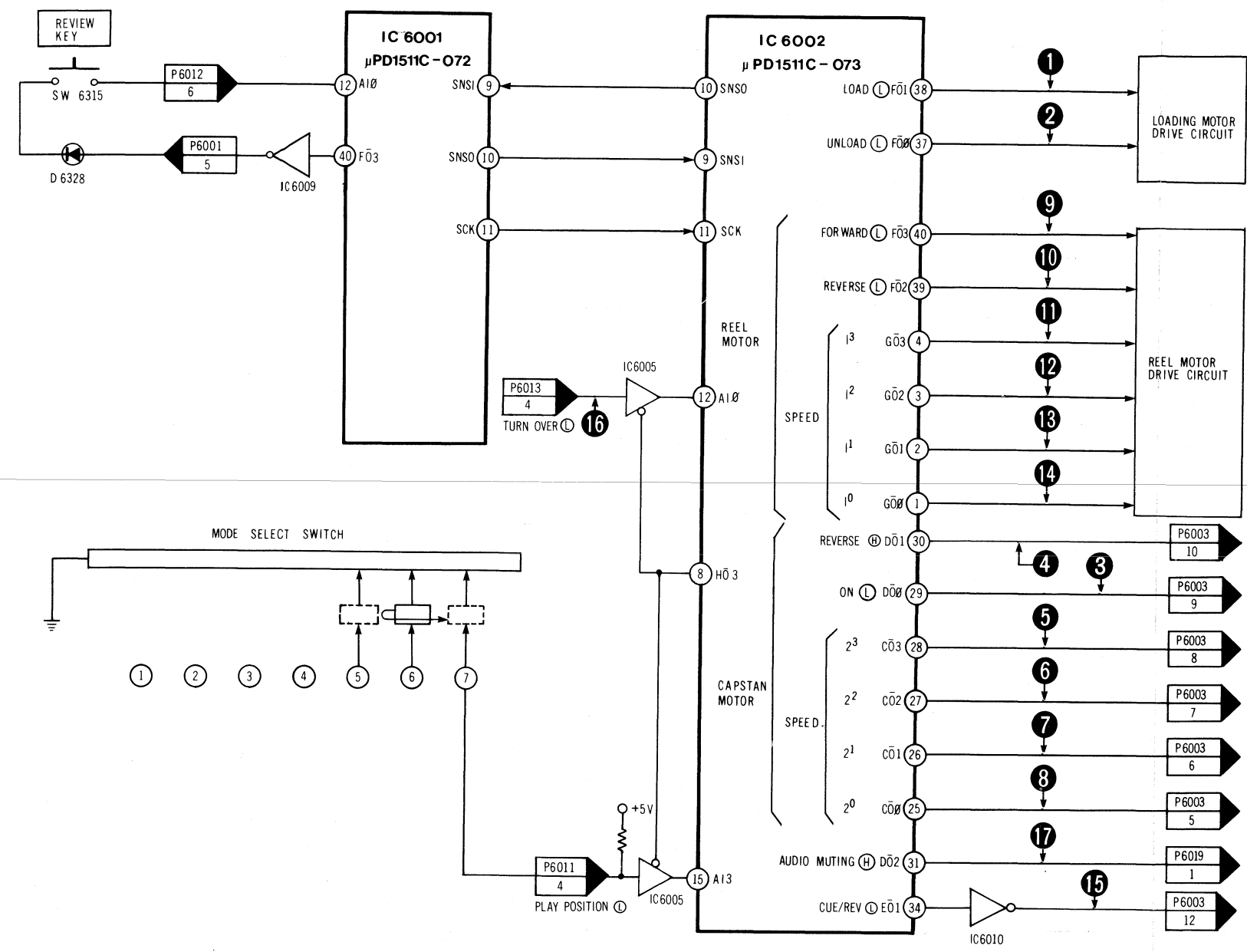
3—15



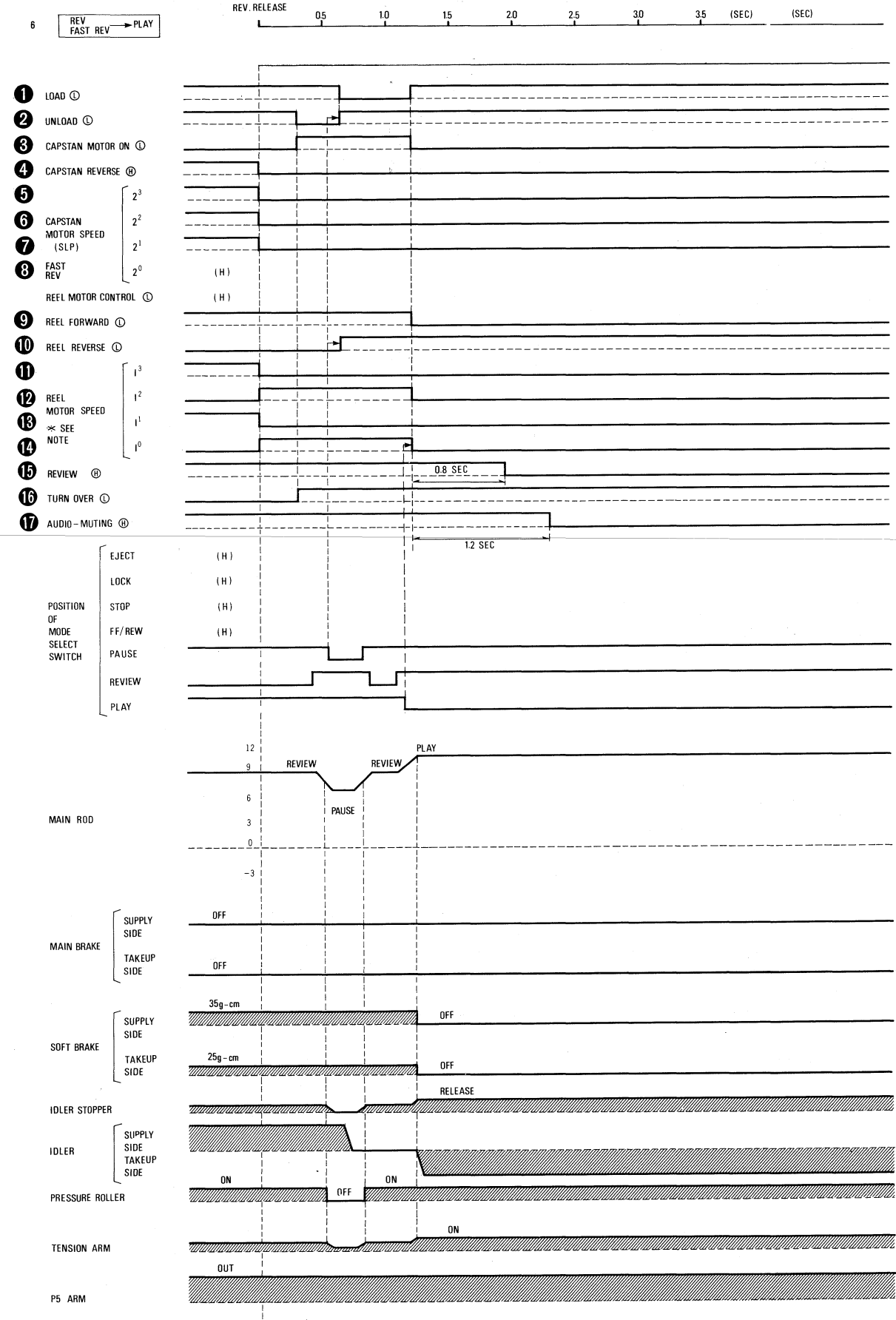
STOP → EJECT BLOCK DIAGRAM (SYSTEM CONTROL)



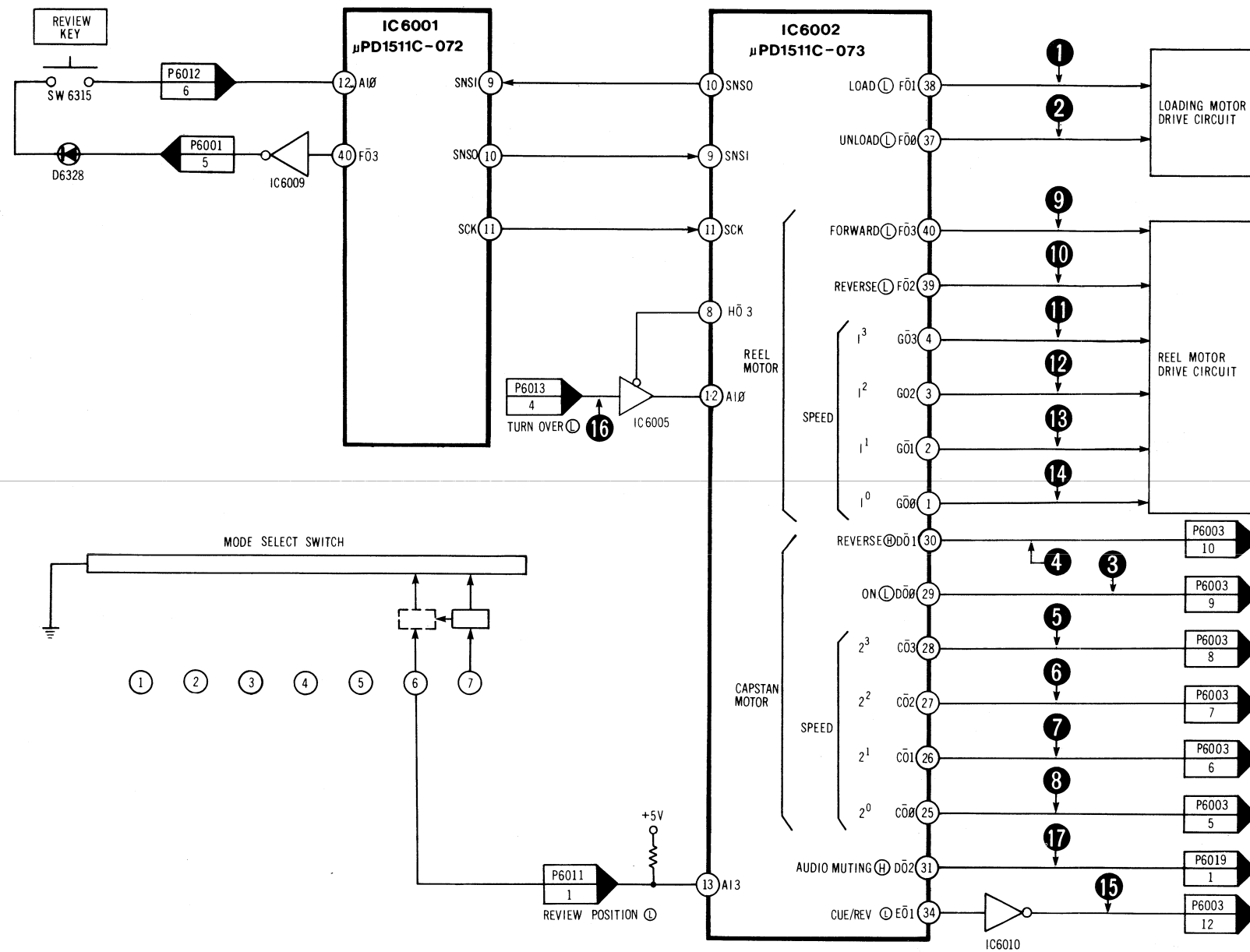
REVIEW → PLAY BLOCK DIAGRAM (SYSTEM CONTROL)



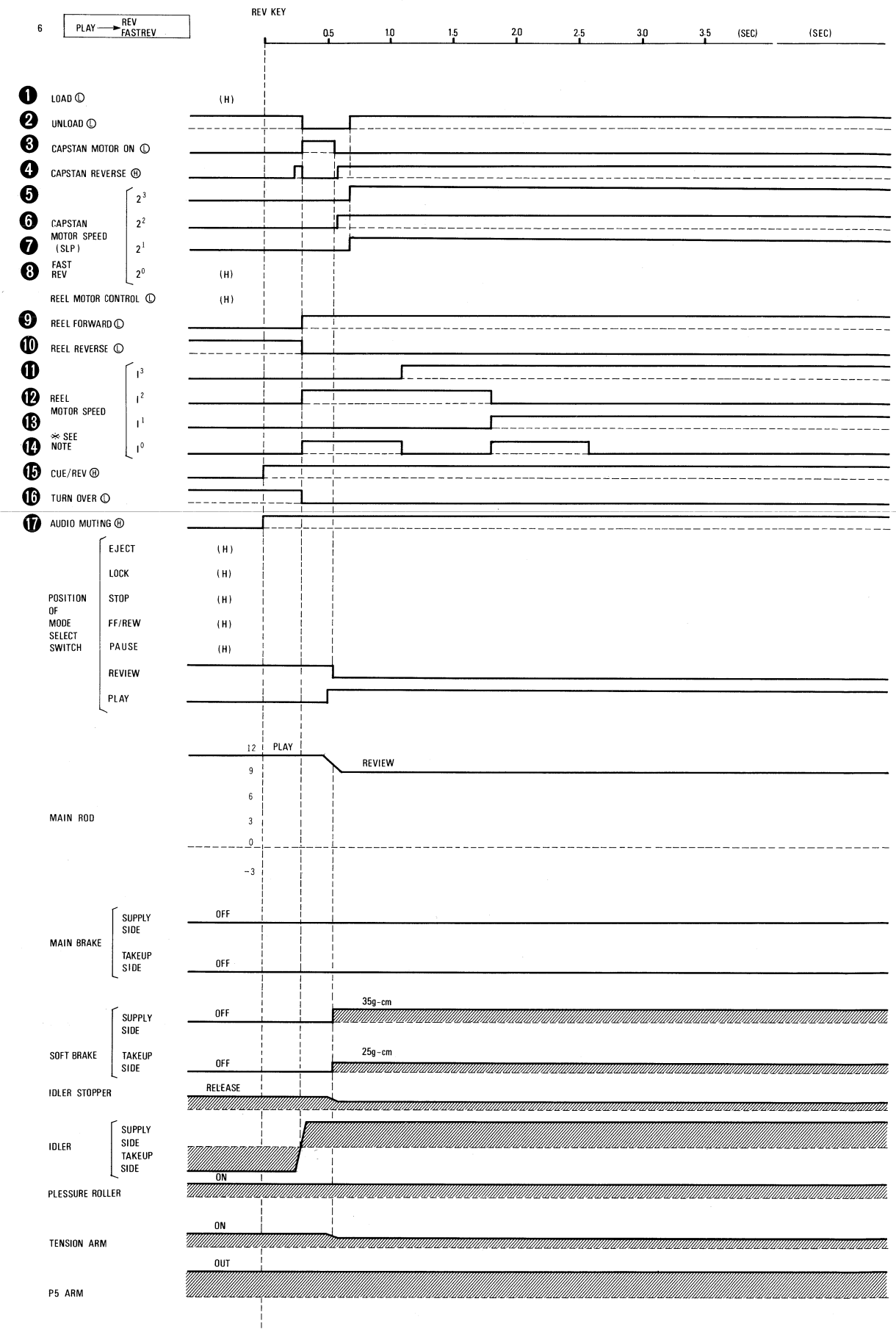
*NOTE: Wave forms 11-14 will change, depending on tape amount.



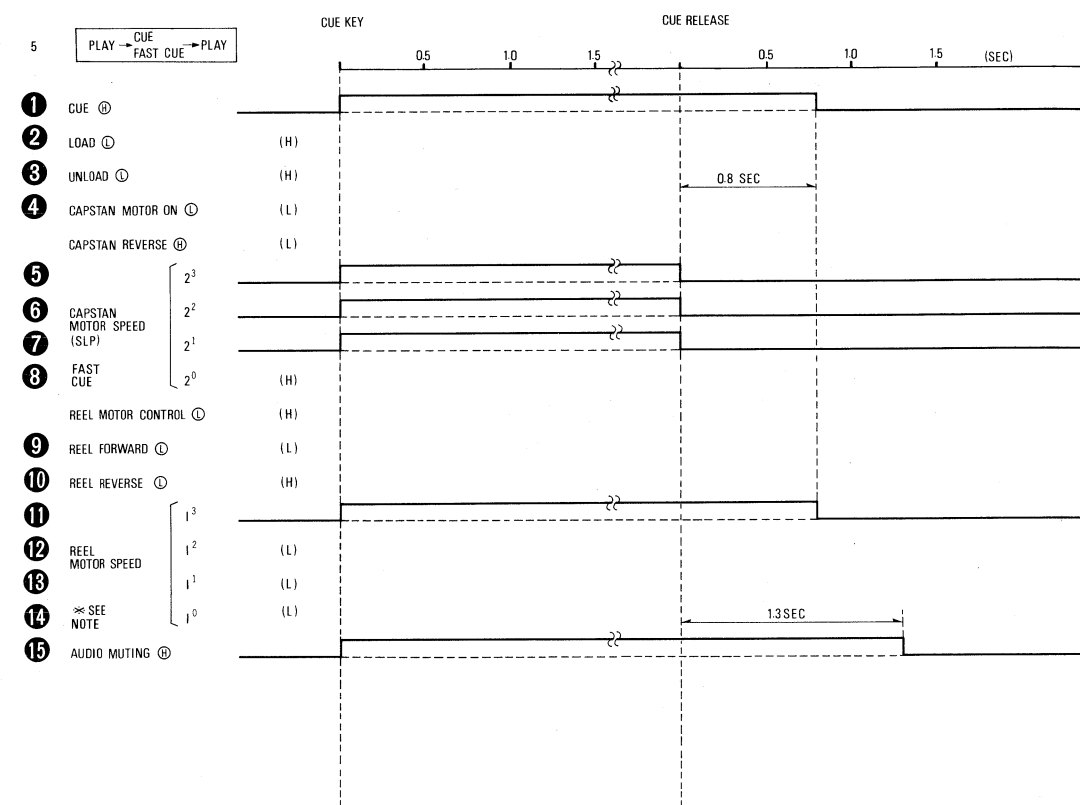
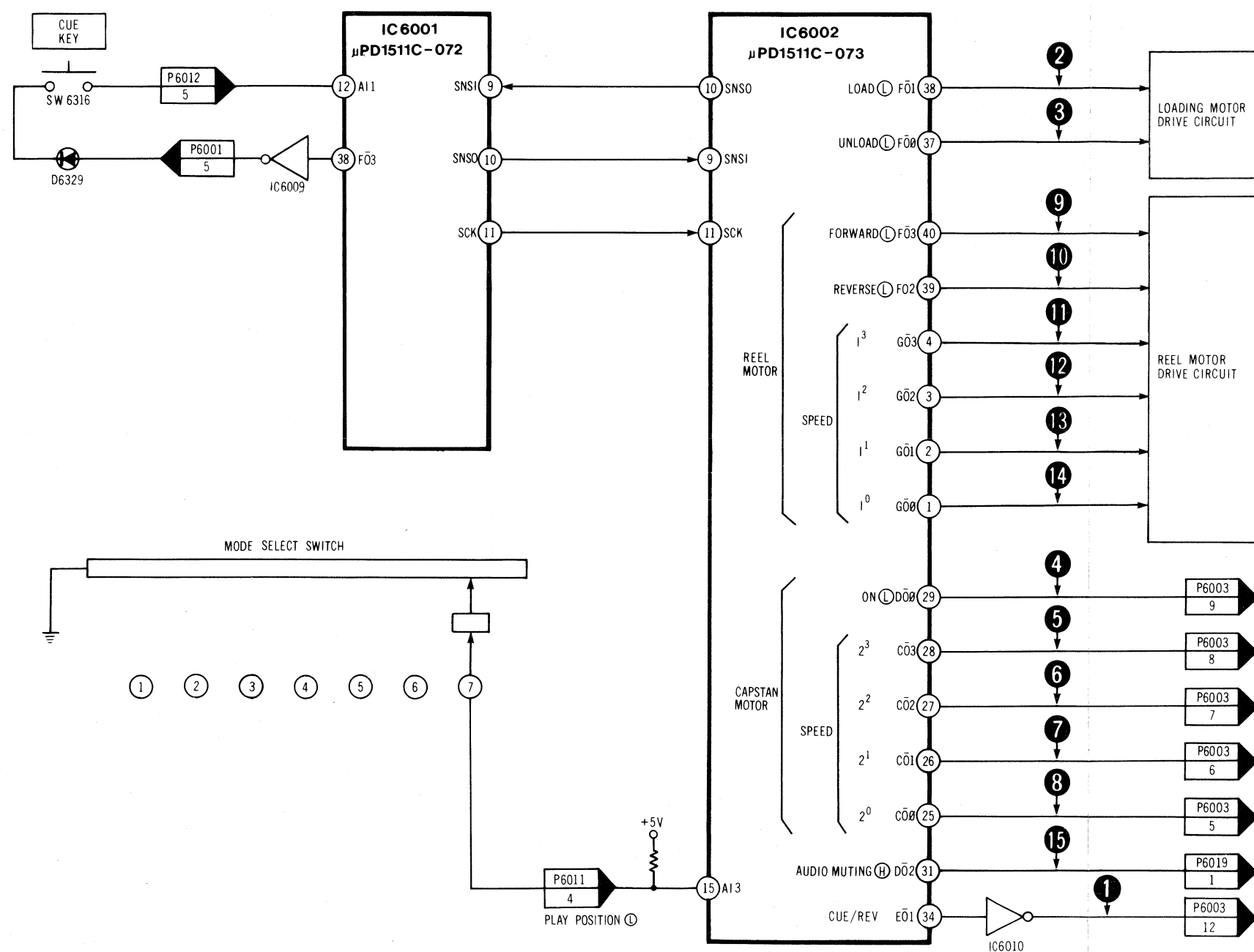
PLAY → REVIEW BLOCK DIAGRAM (SYSTEM CONTROL)



*NOTE: Wave forms 11-14 will change, depending on tape amount.

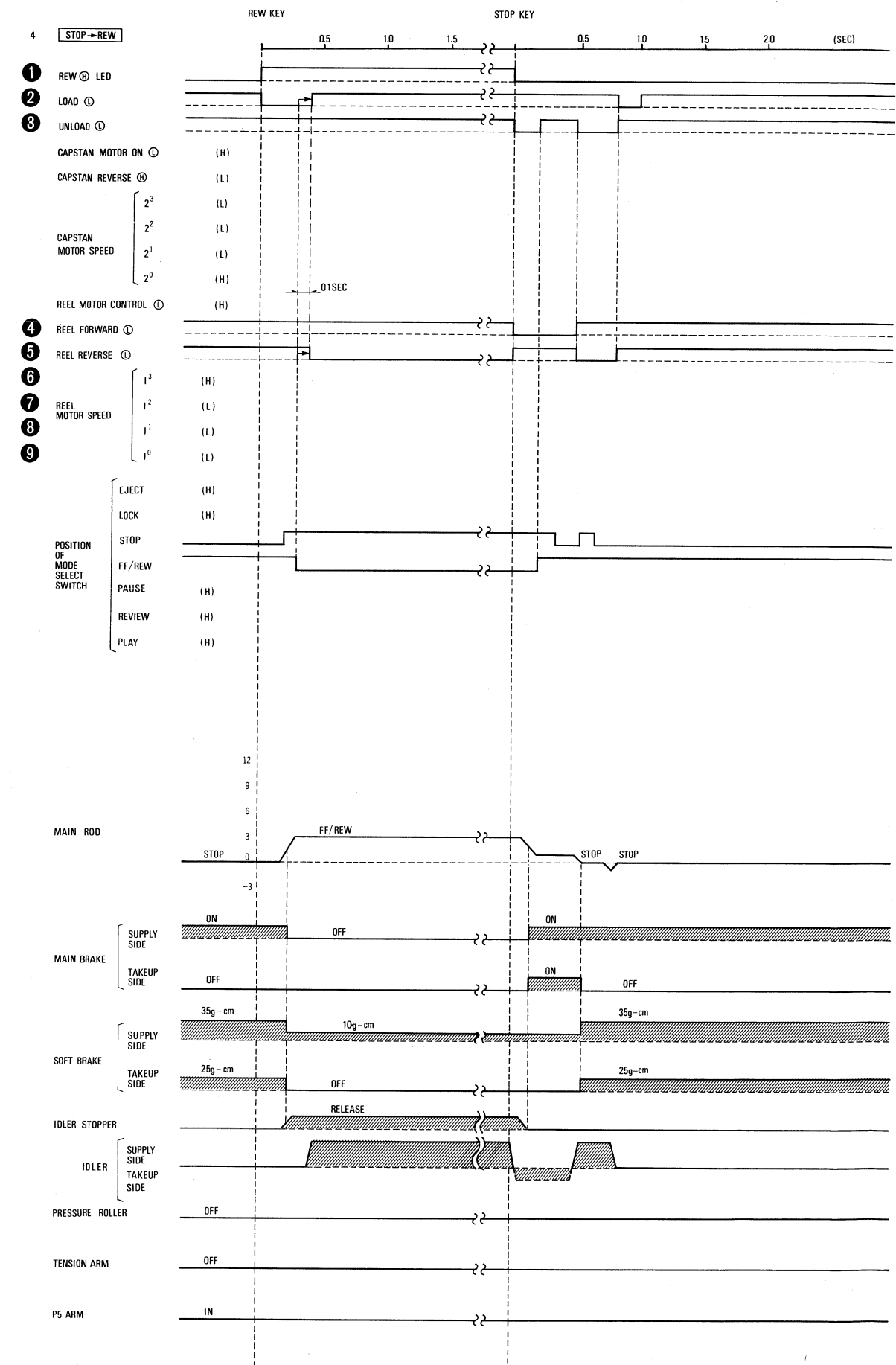
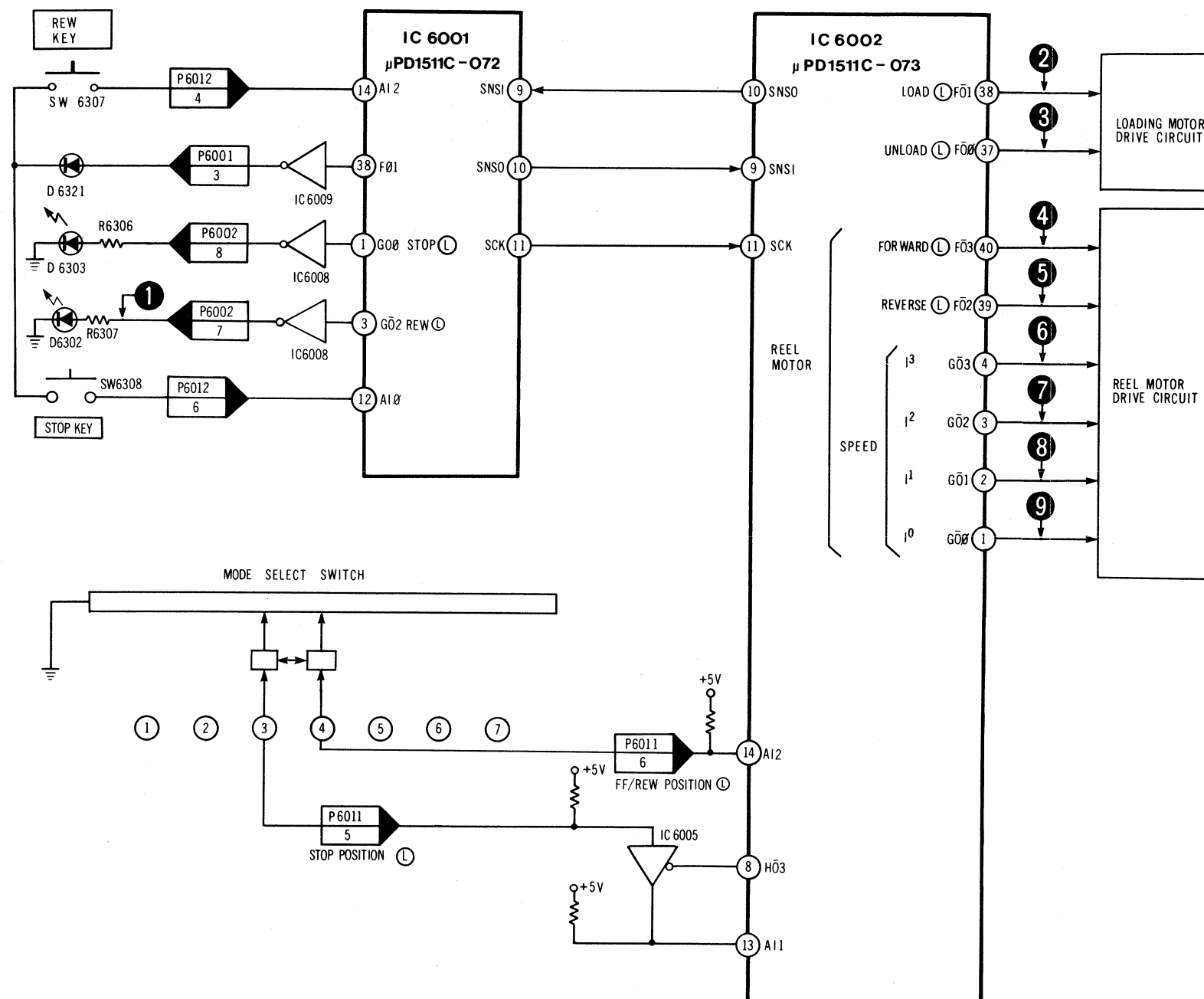


PLAY → CUE → PLAY BLOCK DIAGRAM (SYSTEM CONTROL)

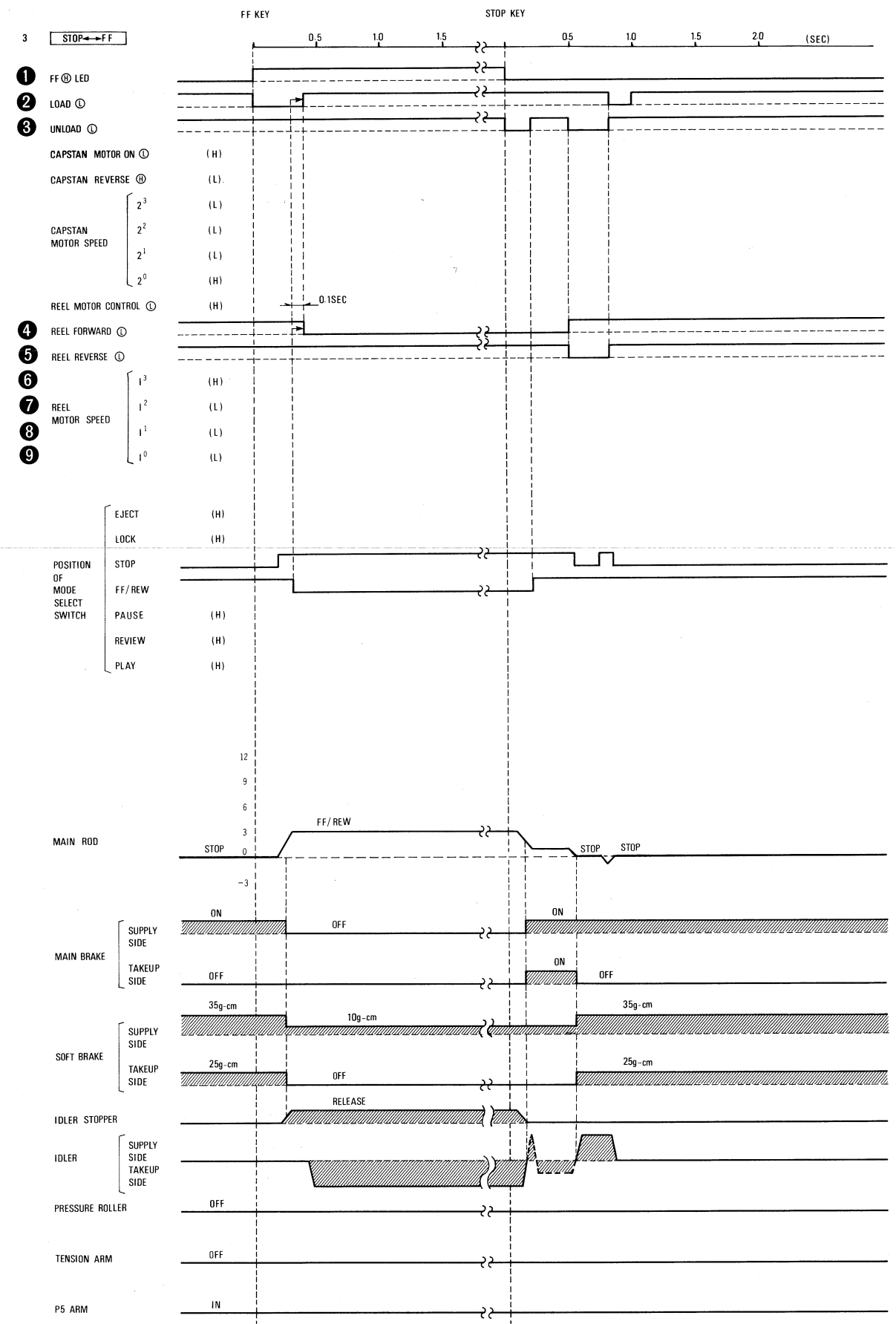
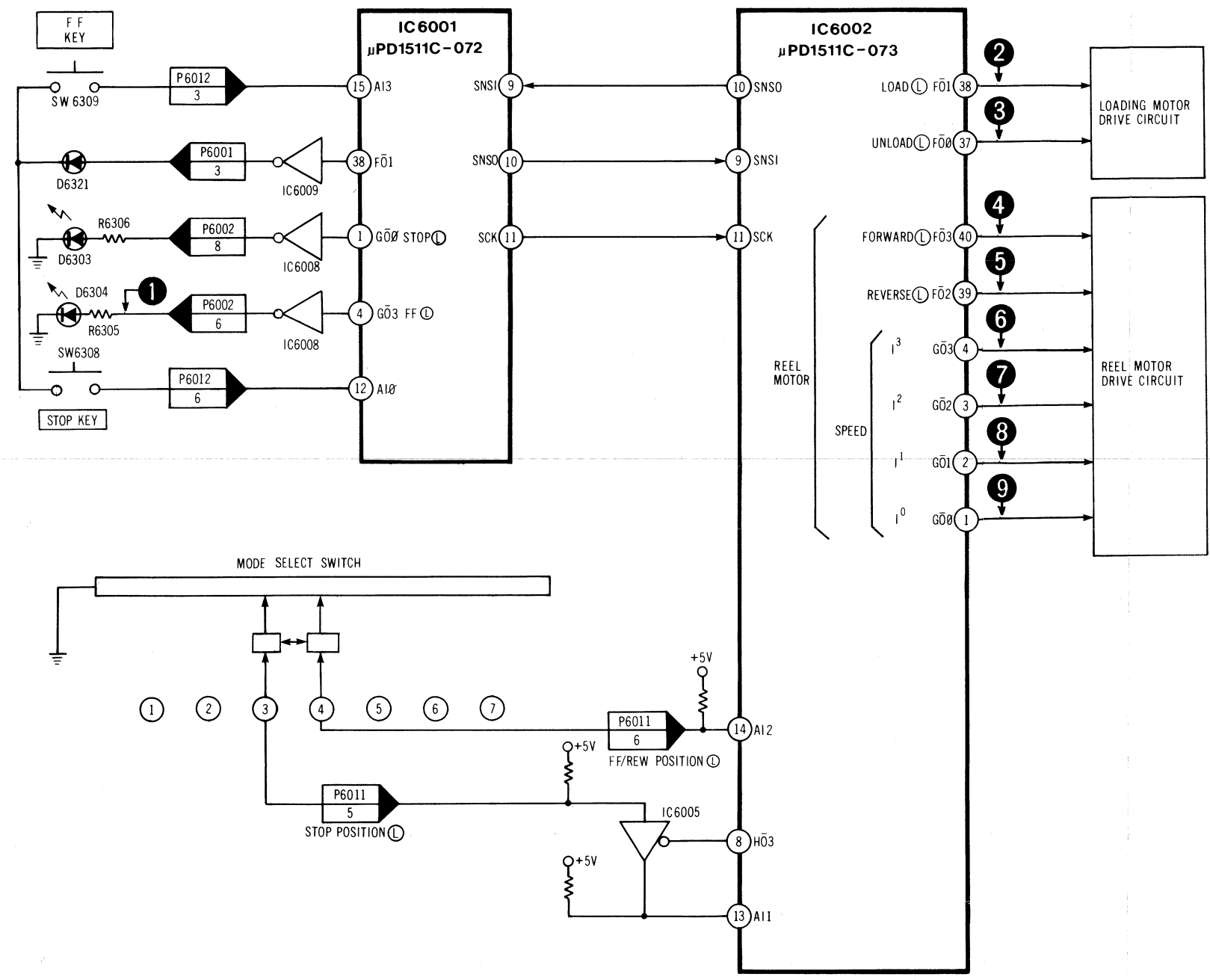


*NOTE: Wave forms 11-14 will change, depending on tape amount.

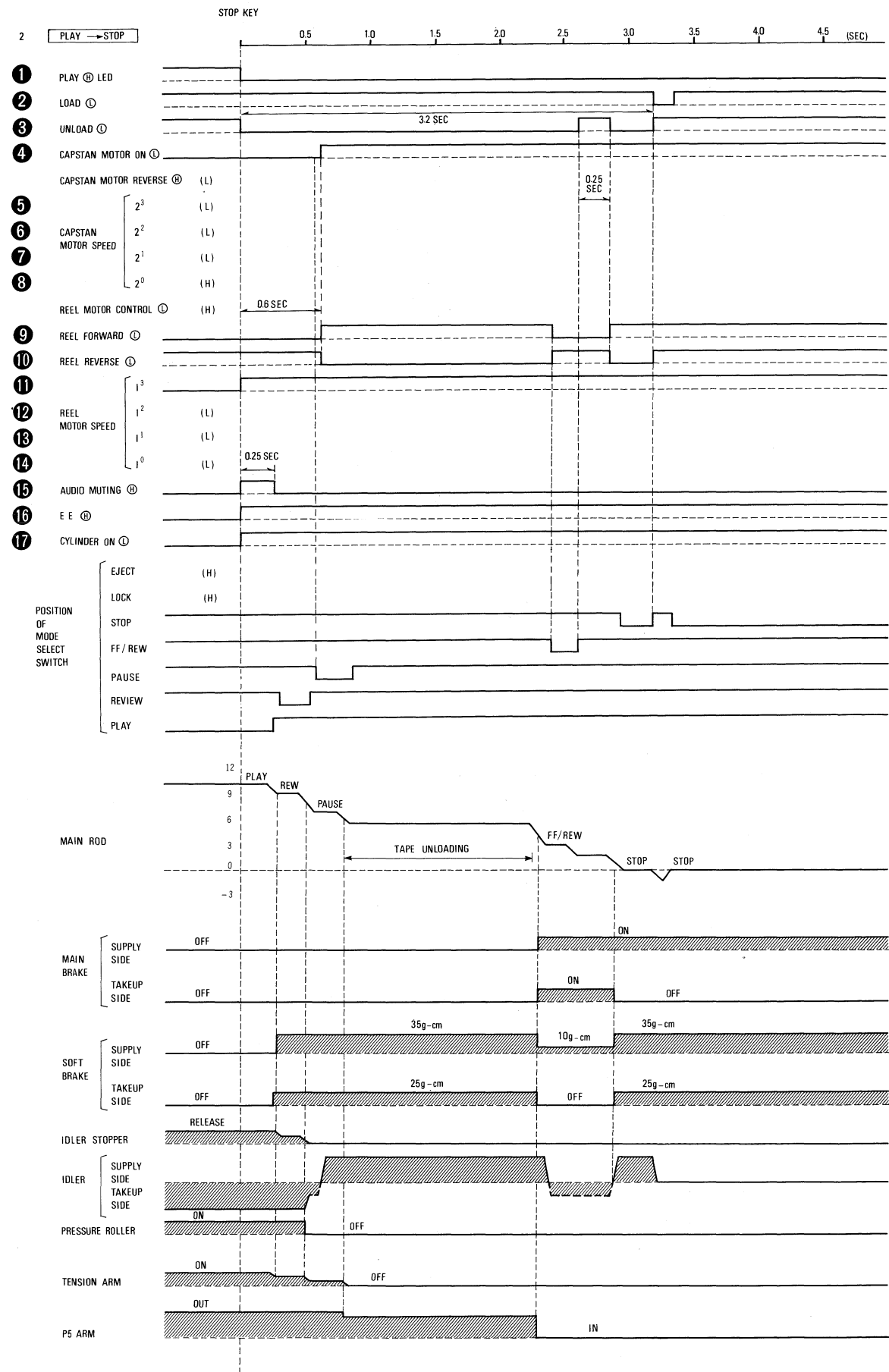
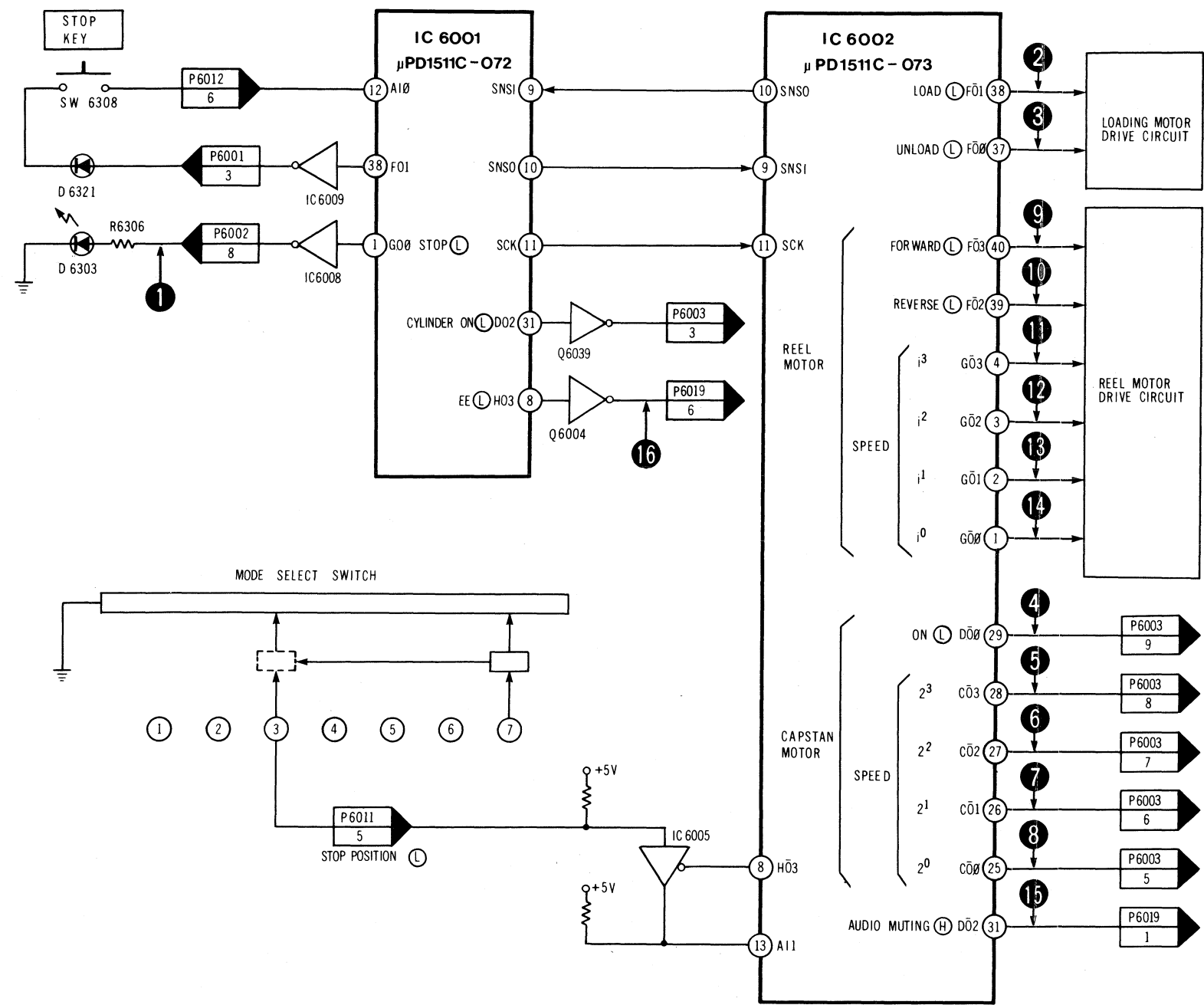
STOP → REW → STOP BLOCK DIAGRAM (SYSTEM CONTROL)



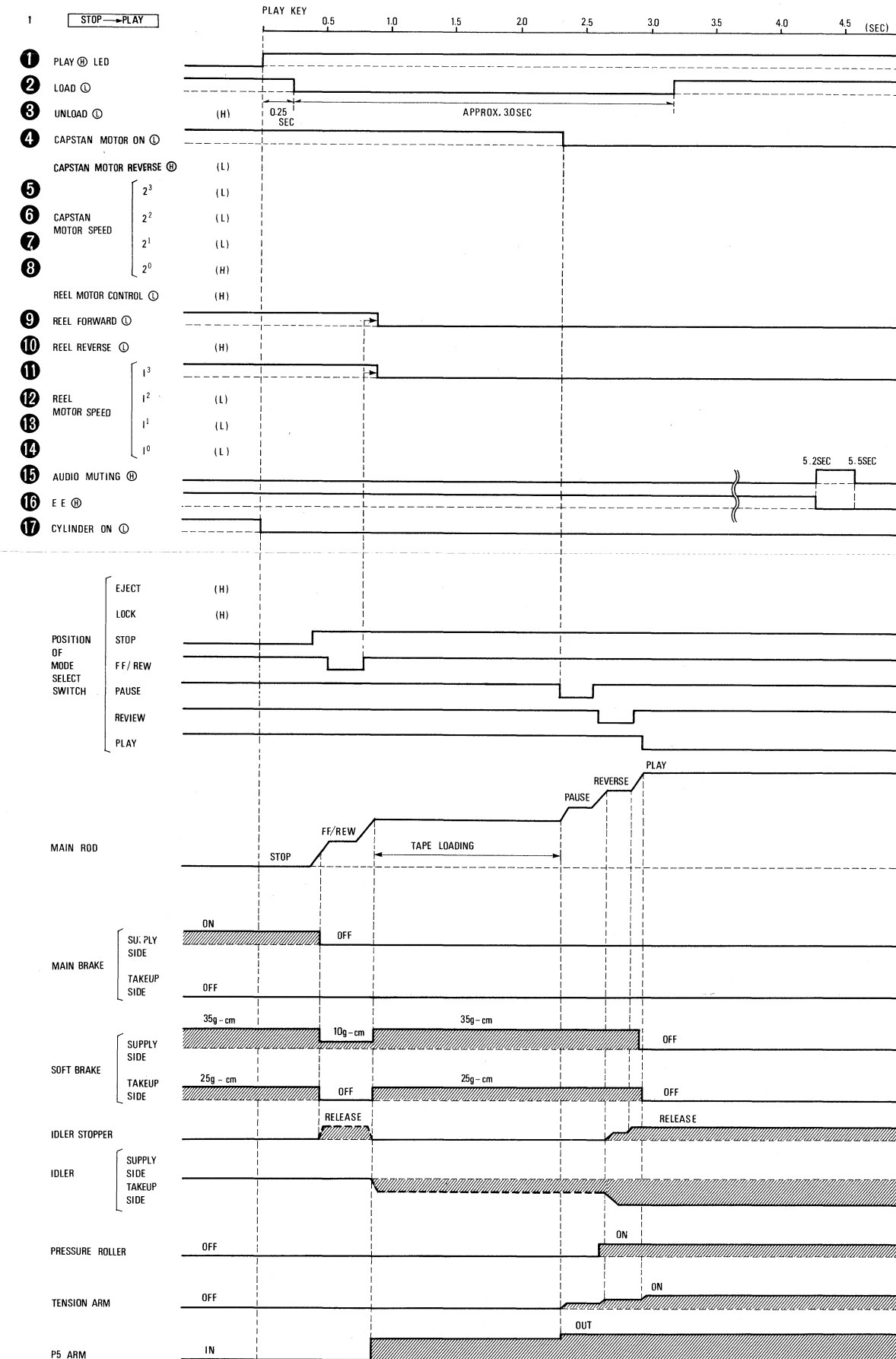
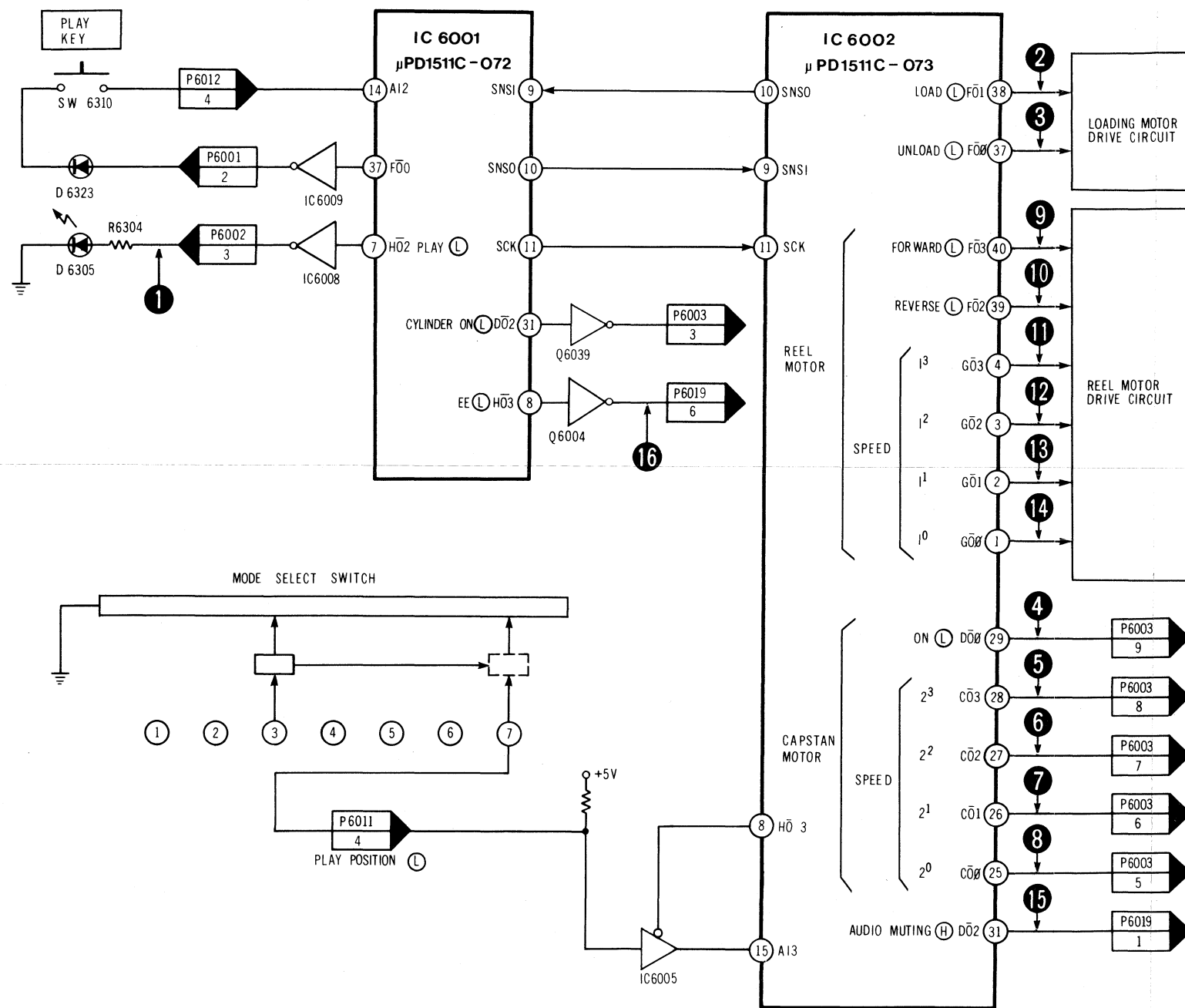
STOP → F.F. → STOP BLOCK DIAGRAM (SYSTEM CONTROL)



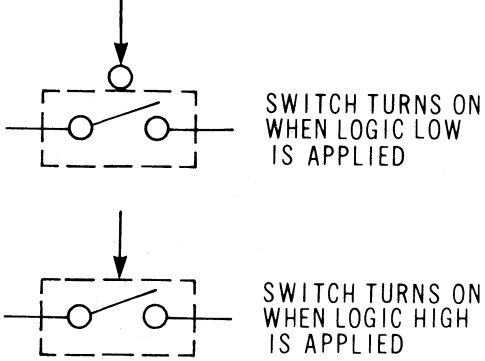
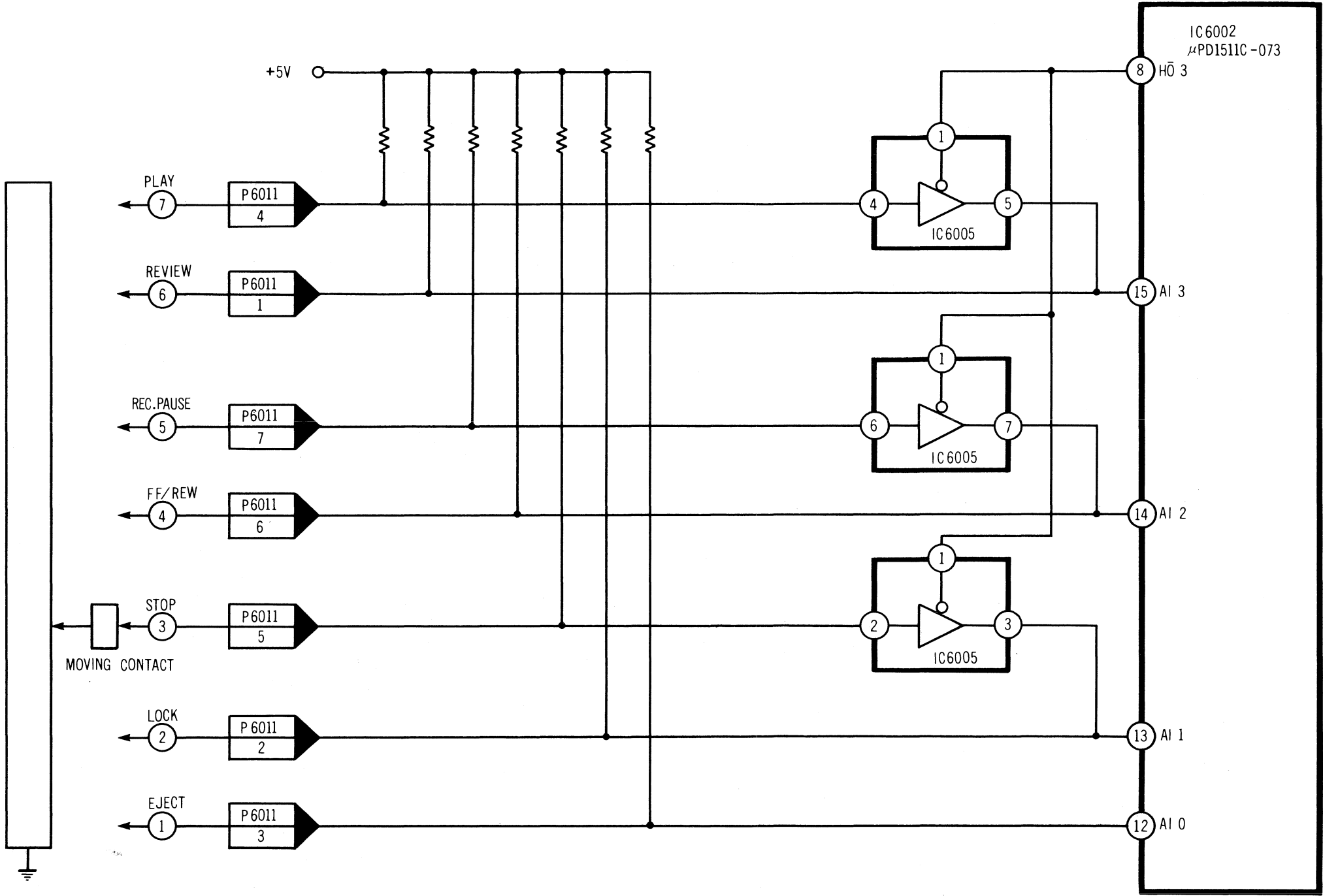
PLAY → STOP BLOCK DIAGRAM (SYSTEM CONTROL)



STOP → PLAY BLOCK DIAGRAM (SYSTEM CONTROL)



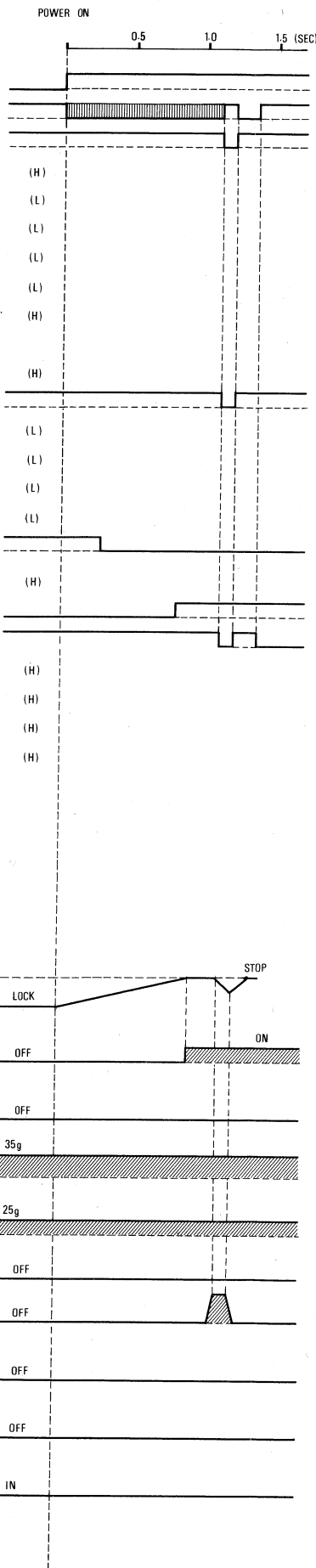
MODE SELECT SWITCH BLOCK DIAGRAM (SYSTEM CONTROL)



μ 

IC6001 I/O CHART (SYSTEM CONTROL)

μPD1511C-072 I/O



PIN	NAME	I/O	OPERATION	
1	GO0	OUTPUT	STOP (L)	
2	GO1	OUTPUT	EJECT (L)	
3	GO2	OUTPUT	REW (L)	
4	GO3	OUTPUT	FF (L)	
5	HO0	OUTPUT	REC (L)	
6	HO1	OUTPUT	AUDIO DUBBING (L)	
7	HO2	OUTPUT	PLAY (L)	
8	HO3	OUTPUT	EE (L)	
9	SNSI	INPUT	SERIAL DATA (from μPD1511C-073)	
10	SNSO	OUTPUT	SERIAL DATA (to μPD1511C-073)	
11	SCK	OUTPUT	SERIAL CLOCK	
12	AI0	INPUT	SCAN PULSE	OPERATION
			FO0	REC KEY
			FO1	STOP KEY
			FO2	F. ADV KEY
			FO3	REV KEY
			EO3	TIMER SET (H)
13	AI1	INPUT	SCAN PUSLE	OPERATION
			FO0	A. DUB KEY
			FO1	EJECT KEY
			FO3	CUE KEY
			EO3	TIMER REC (H)
14	AI2	INPUT	SCAN PULSE	OPERATION
			FO0	PLAY KEY
			FO1	REW KEY
			FO3	PAUSE KEY
			EO3	CAMERA PAUSE (L)
15	AI3	INPUT	SCAN PULSE	OPERATION
			FO1	FF KEY
			FO3	MEMORY COUNTER
			EO3	SAFETY TAB (L)

PIN	NAME	I/O	OPERATION	
16	BI0	INPUT	SCAN PULSE	OPERATION
			EO3	SLP (H)
			—	TV (L)/VCR (H)
			SCAN PULSE	OPERATION
17	BI1	INPUT	EO3	LP (L)/SLP (H)
			—	POWER SW (H)
18	BI2	INPUT	IR REMOTE DATA	
19	BI3	INPUT	SYSTEM CLOCK (1.8kHz)	
20	TEST	—	GND	
21	GND	—	GND	
22	X1	INPUT	OSCILLATOR REF 3.58MHz	
23	X2	INPUT	OSCILLATOR REF 3.58MHz	
24	RESET	INPUT	RESET (L)	
25	CO0	OUTPUT	POWER ON (L)	
26	CO1	OUTPUT	VCR (L)	
27	CO2	OUTPUT	POWER LED (L)	
28	CO3	OUTPUT	CH UP (H)	
29	DO0	OUTPUT	FRAME ADV (H)	
30	DO1	OUTPUT	AUDIO MUTING (H)	
31	DO2	OUTPUT	CYLINDER MOTOR ON (L)	
32	DO3	OUTPUT	PAUSE (L)	
33	EO0	OUTPUT	SLOW (H)	
34	E01	OUTPUT	SLOW SPEED UP (L)	
35	EO2	OUTPUT	SLOW SPEED DOWN (L)	
36	EO3	OUTPUT	EO3 SCAN PULSE	
37	FO0	OUTPUT	FO0 SCAN PULSE	
38	FO1	OUTPUT	FO1 SCAN PULSE	
39	FO2	OUTPUT	FO2 SCAN PULSE	
40	FO3	OUTPUT	FO3 SCAN PULSE	
41	VCC	—	+5V	
42	INT	INPUT	IR REMOTE DATA	

IC6002 I/O CHART (SYSTEM CONTROL)

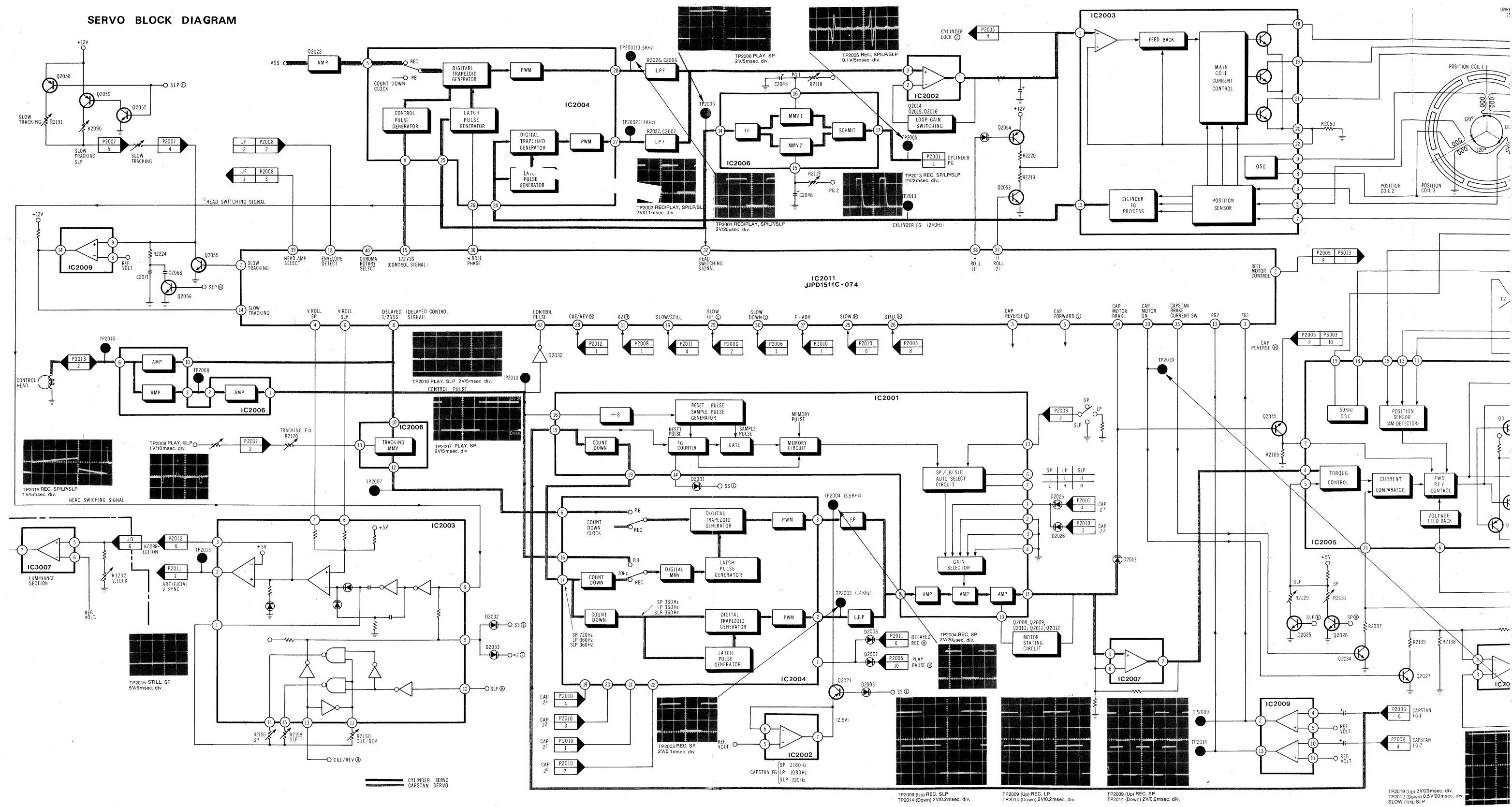
μPD1511C-073 I/O



PIN	NAME	I/O	OPERATION	
1	GO0	OUTPUT	REEL MOTOR I ⁰	
2	GO1	OUTPUT	REEL MOTOR I ¹	
3	GO2	OUTPUT	REEL MOTOR I ²	
4	GO3	OUTPUT	REEL MOTOR I ³	
5	HO0	OUTPUT	REEL MOTOR PLAY	
6	HO1	OUTPUT	REEL MOTOR UNLOADING	
7	HO2	OUTPUT	REEL MOTOR FF/REW	
8	HO3	OUTPUT	SENSOR LED (HO3 SCAN PULSE)	
9	SNSI	INPUT	SERIAL DATA (from μPD1511C-072)	
10	SNSO	OUTPUT	SERIAL DATA (to μPD1511C-072)	
11	SCK	INPUT	SERIAL CLOCK	
12	AI0	INPUT	EJECT POSITION	
13	AI1	INPUT	SCAN PULSE	OPERATION
			HO3 (L)	STOP POSITION
			HO3 (H)	LOCK POSITION
14	AI2	INPUT	SCAN PULSE	OPERATION
			HO3 (L)	PAUSE POSITION
			HO3 (H)	FF/REW POSITION
15	AI3	INPUT	SCAN PULSE	OPERATION
			HO3 (L)	PLAY POSITION
			HO3 (H)	REV POSITION
16	BI0	INPUT	SCAN PULSE	OPERATION
			HO3 (L)	SUPPLY PHOTO TR. ON DETECT
			HO3 (H)	CASSETTE UP/DOWN DETECT
17	BI1	INPUT	SCAN PULSE	OPERATION
			HO3 (L)	TAKE UP PHOTO TR. ON DETECT
			HO3 (H)	DEW DETECT

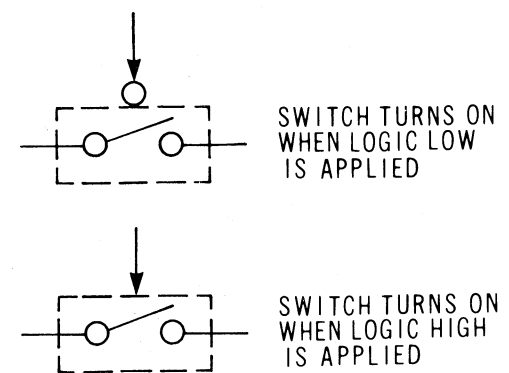
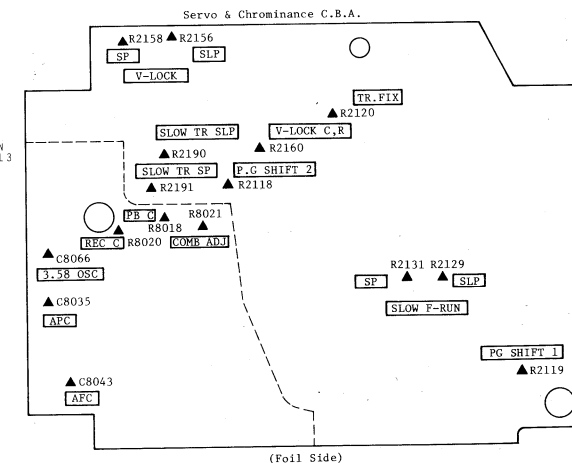
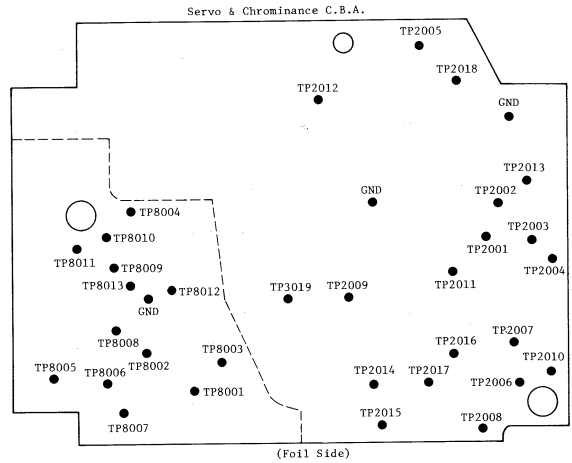
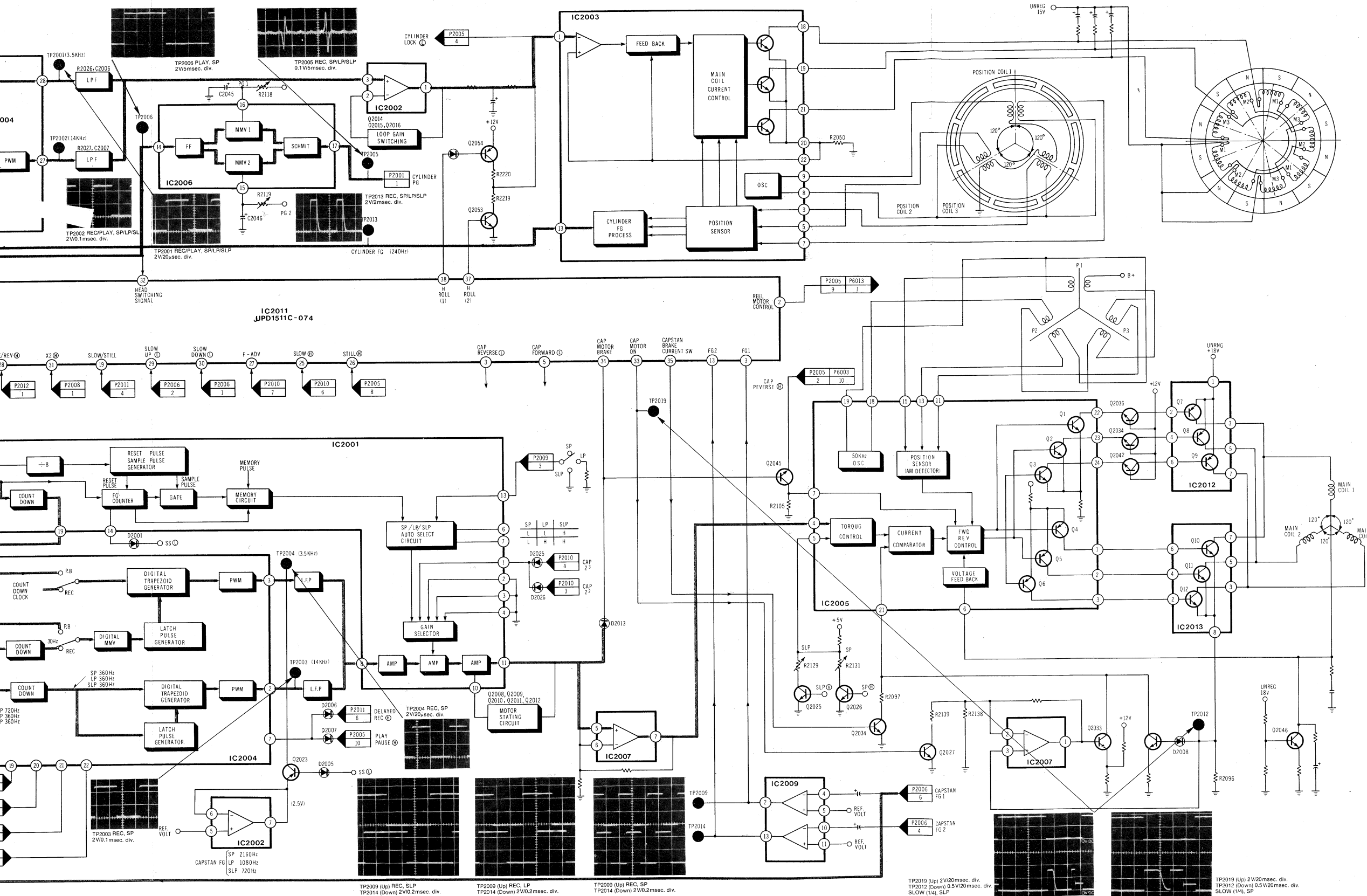
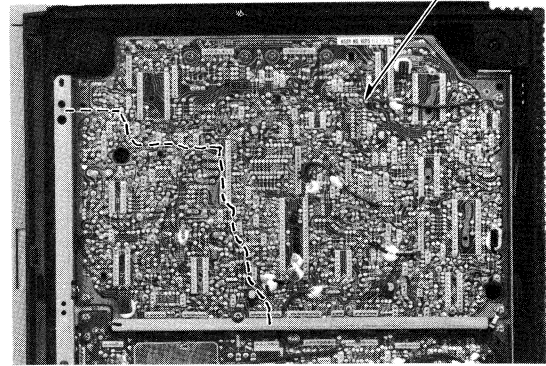
PIN	NAME	I/O	OPERATION
18	BI2	INPUT	REEL MOTOR PULSE
19	BI3	INPUT	CAPSTAN MOTOR FG
20	TEST	—	GND
21	GND	—	GND
22	X1	INPUT	OSCILLATOR REF 3.58MHz
23	X2	INPUT	OSCILLATOR REF 3.58MHz
24	RESET	INPUT	RESET (L)
25	CO0	OUTPUT	CAPSTAN MOTOR SPEED 2 ⁰
26	CO1	OUTPUT	CAPSTAN MOTOR SPEED 2 ¹
27	CO2	OUTPUT	CAPSTAN MOTOR SPEED 2 ²
28	CO3	OUTPUT	CAPSTAN MOTOR SPEED 2 ³
29	DO0	OUTPUT	CAPSTAN MOTOR ON (L)
30	DO1	OUTPUT	CAPSTAN MOTOR REVERSE (H)
31	DO2	OUTPUT	AUDIO MUTING (H)
32	DO3	OUTPUT	VIDEO MUTING (H)
33	EO0	OUTPUT	DELAY REC (L)
34	EO1	OUTPUT	CUE/REVIEW (L)
35	EO2	OUTPUT	DELAY AUDIO DUB (L)
36	EO3	OUTPUT	—
37	FO0	OUTPUT	UNLOAD (L)
38	FO1	OUTPUT	LOAD (L)
39	FO2	OUTPUT	REEL MOTOR REVERSE (L)
40	FO3	OUTPUT	REEL MOTOR FORWARD (L)
41	VCC	—	+5V
42	INT	INPUT	REEL MOTOR PULSE

SERVO BLOCK DIAGRAM

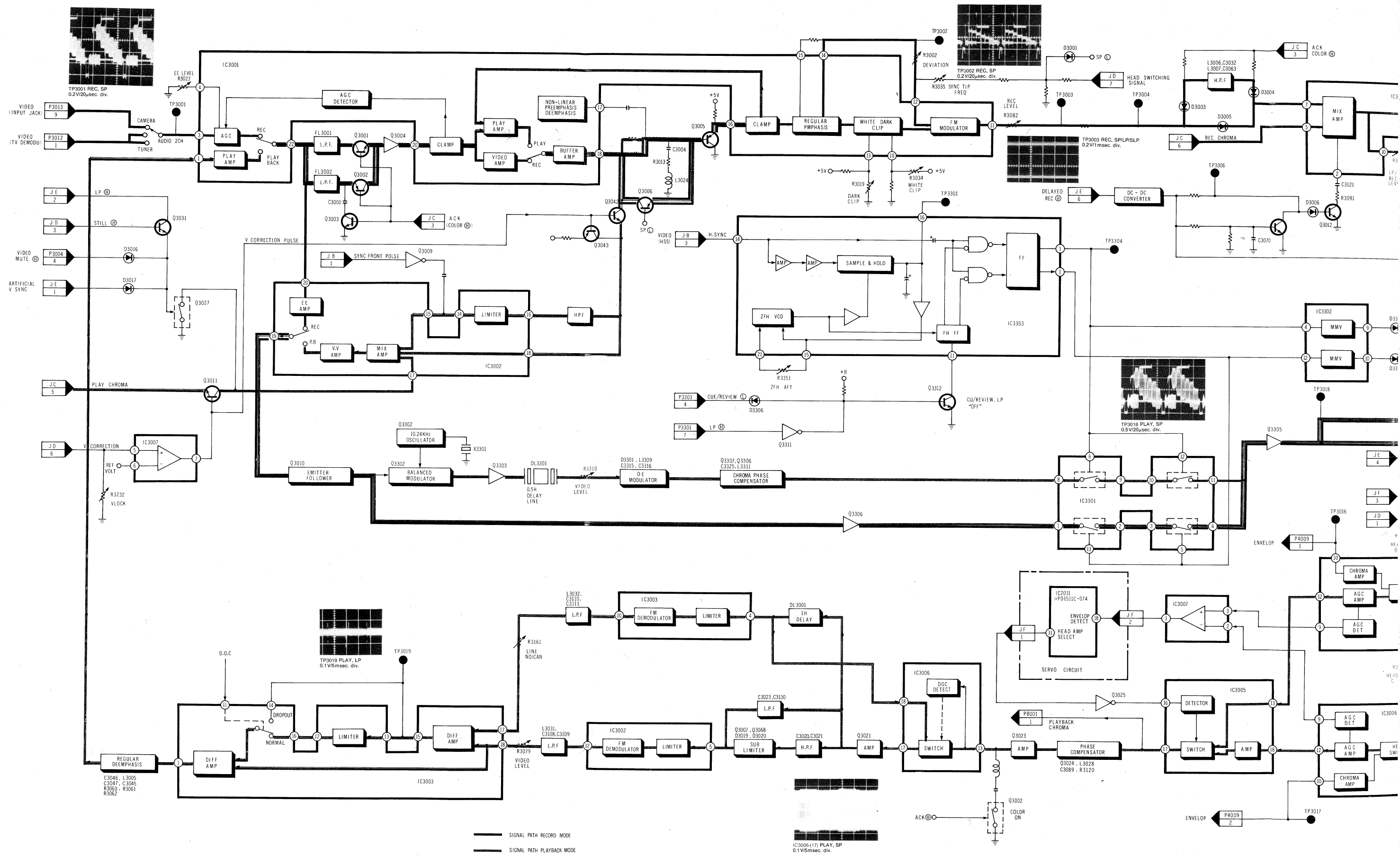


3-19 SERVO BLOCK DIAGRAM

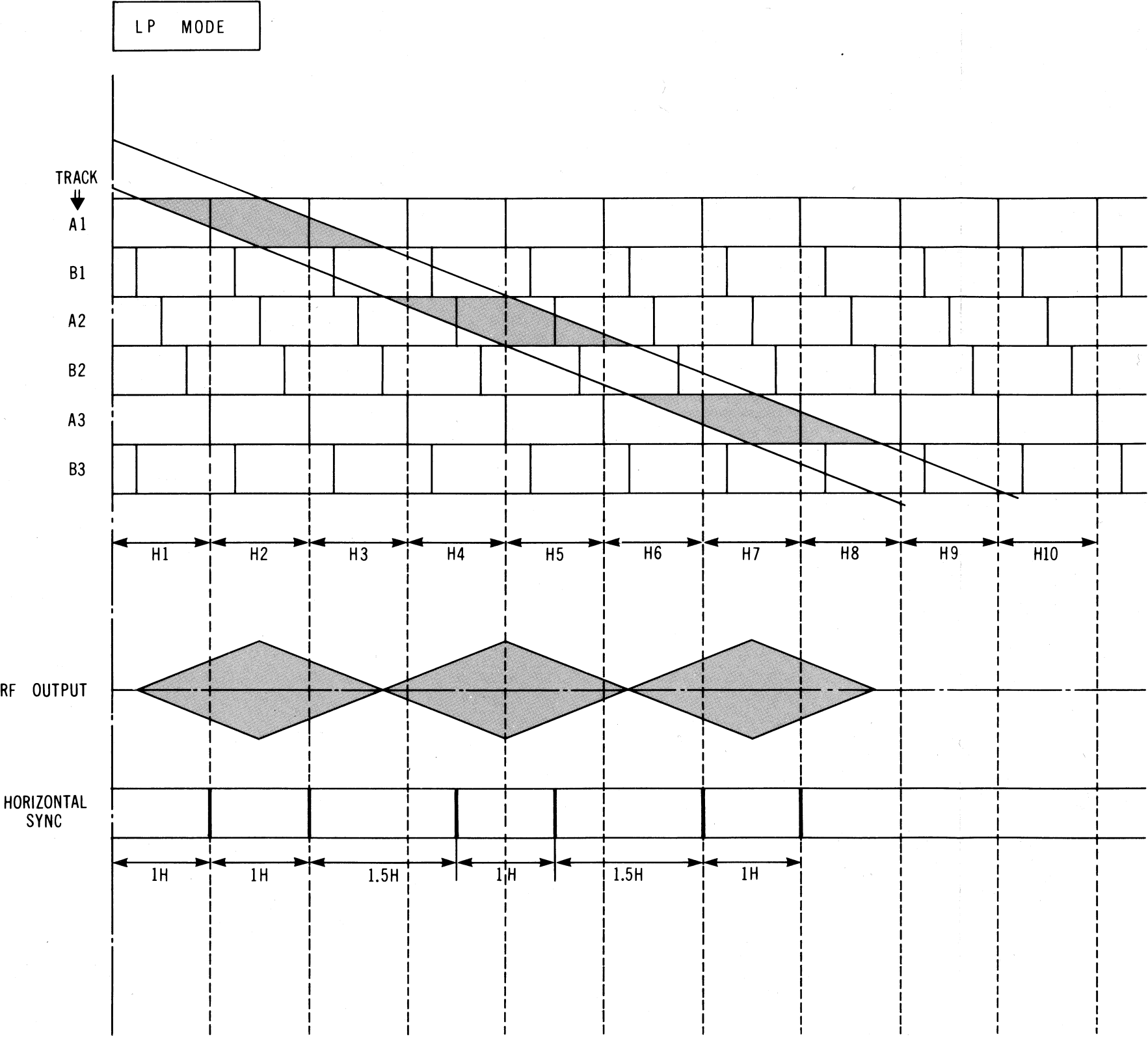
Servo Section



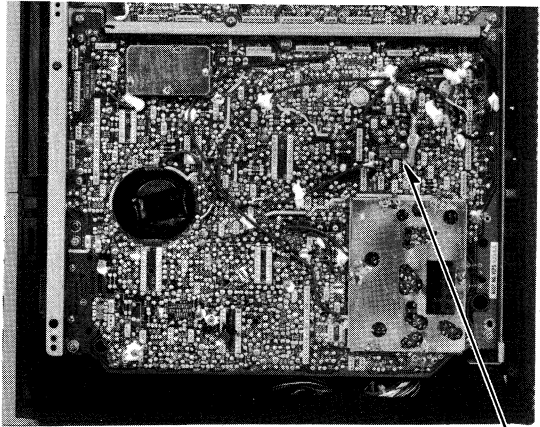
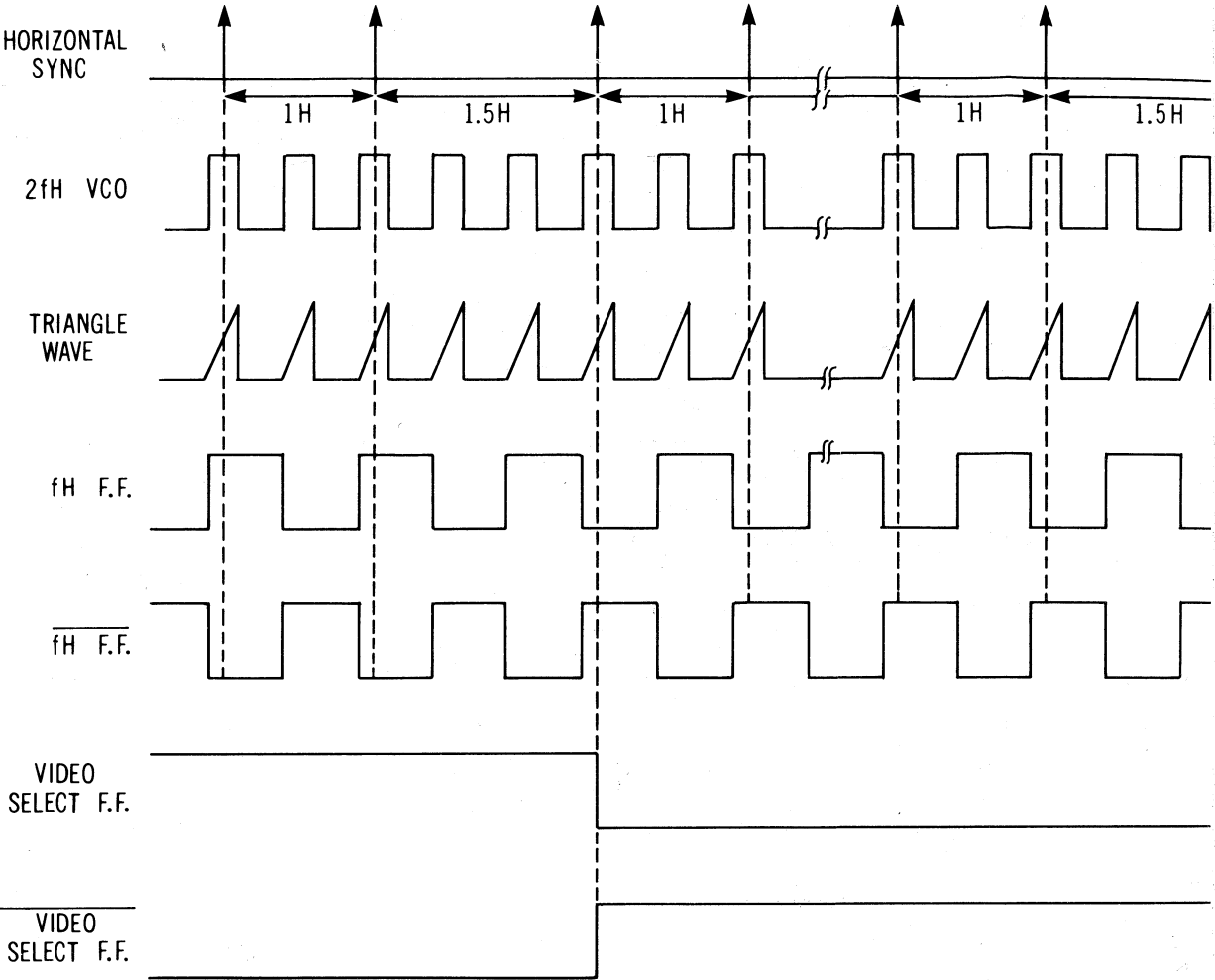
3-20 LUMINANCE PROCESS BLOCK DIAGRAM



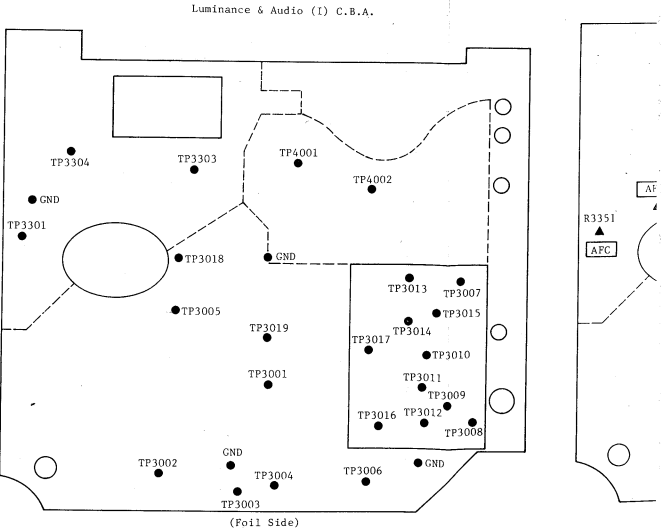
1/2H CORRECTION—LP×9 TAPE FORMAT



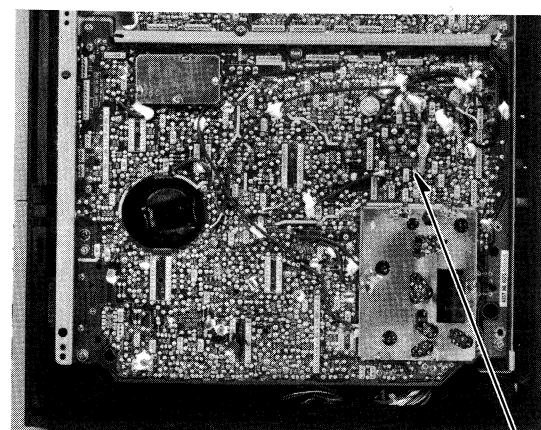
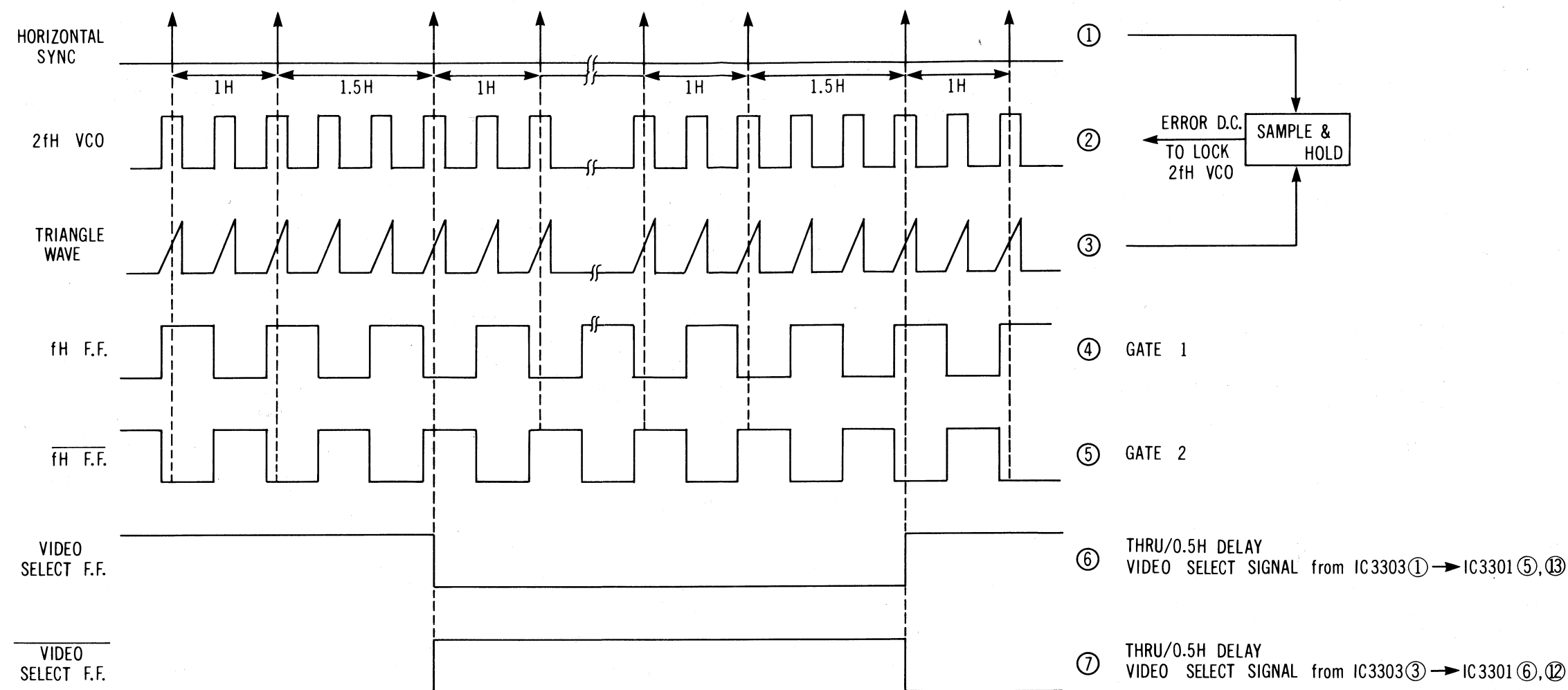
1/2H CORRECTION—LP×9 TIMING CHART



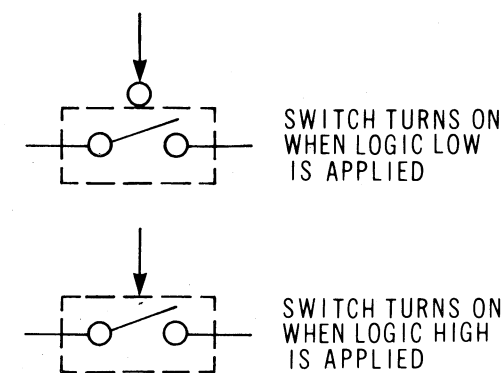
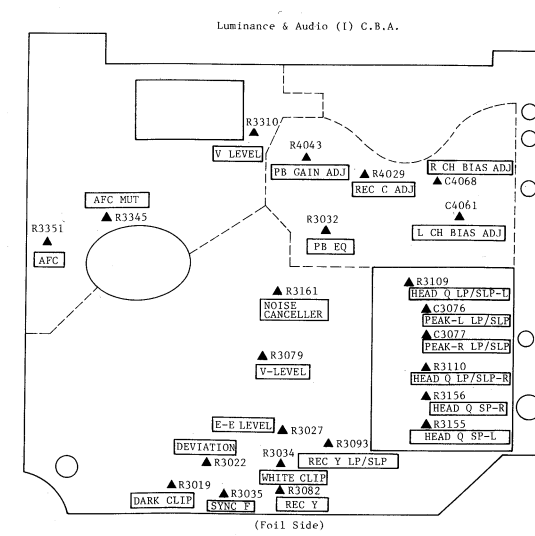
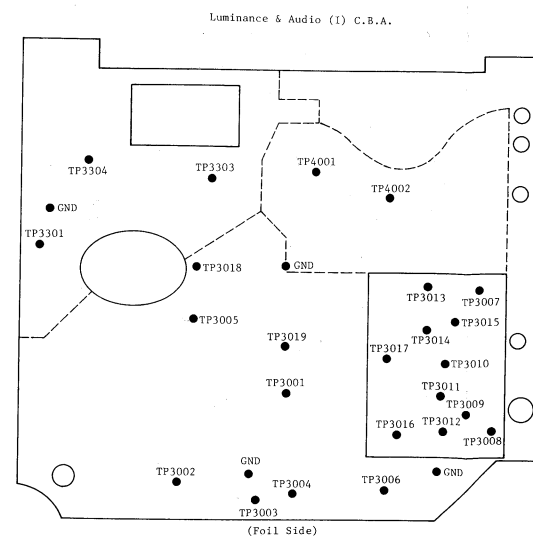
Luminance & Audio [I] Section



1/2H CORRECTION—LP×9 TIMING CHART

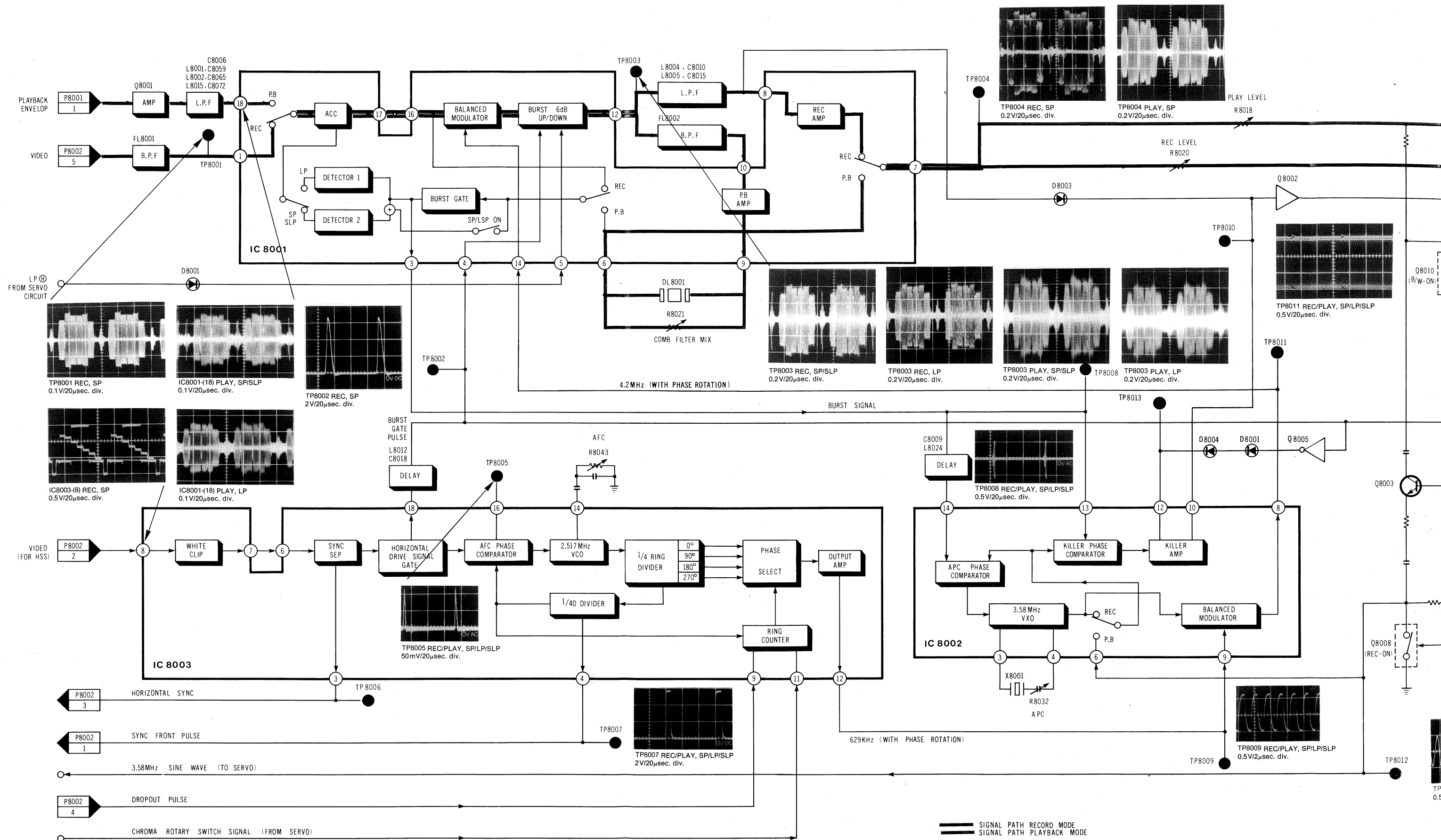


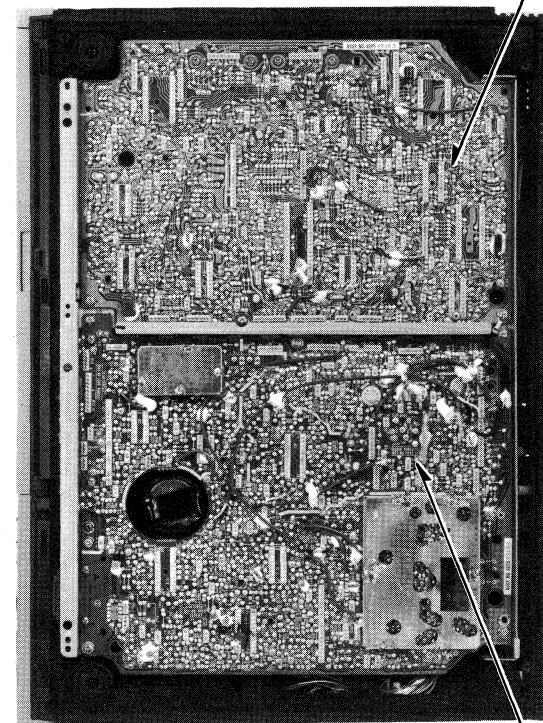
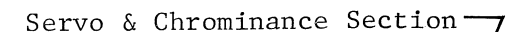
Luminance & Audio [I] Section



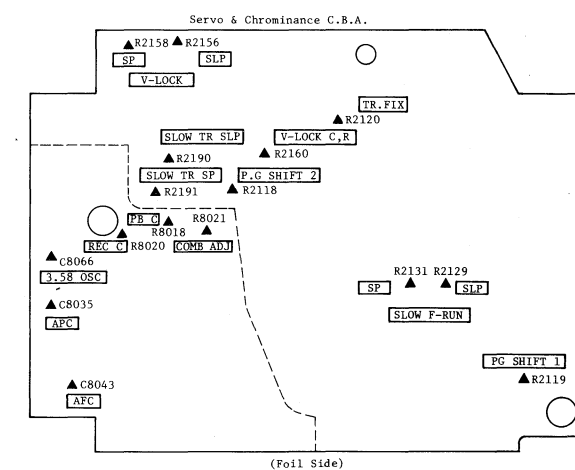
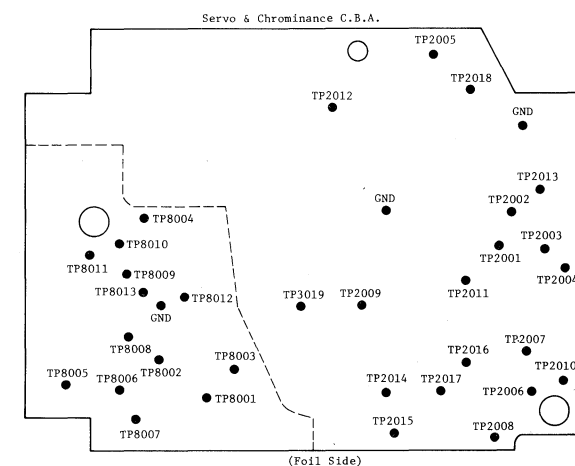
CHROMINANCE PROCESS BLOCK DIAGRAM

SWITCH TURNS ON WHEN LOGIC LOW IS APPLIED



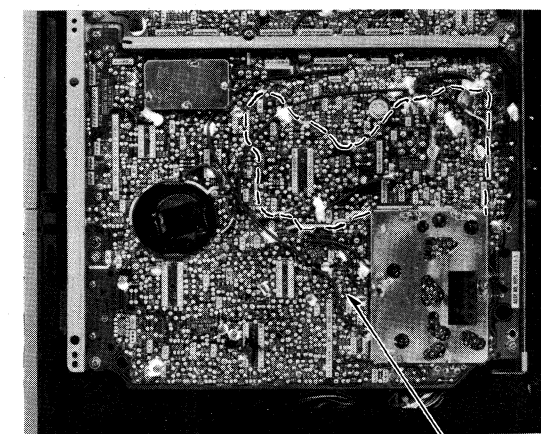
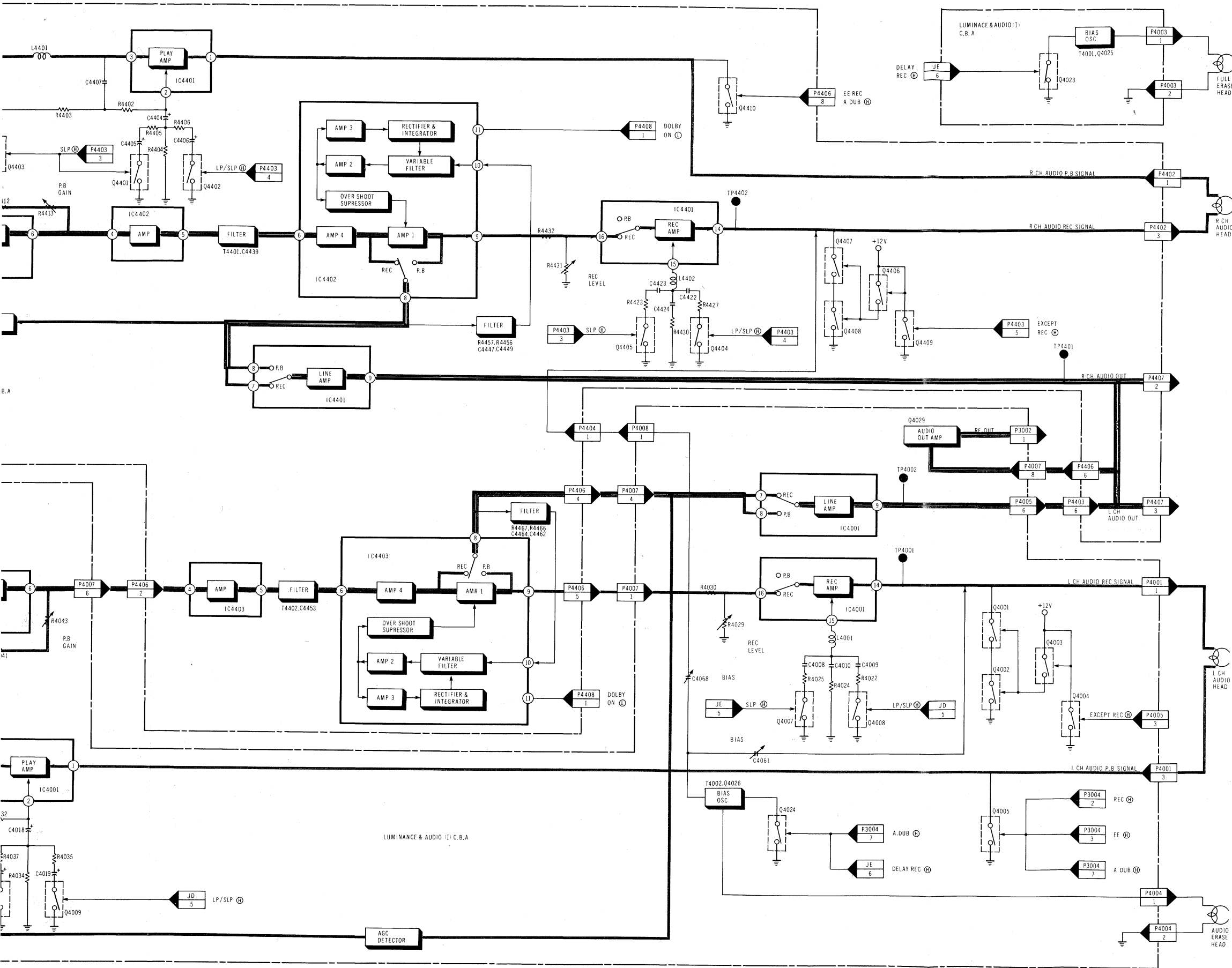


Luminance & Audio [I] Section

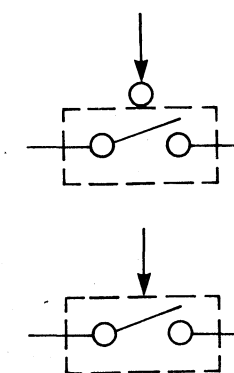
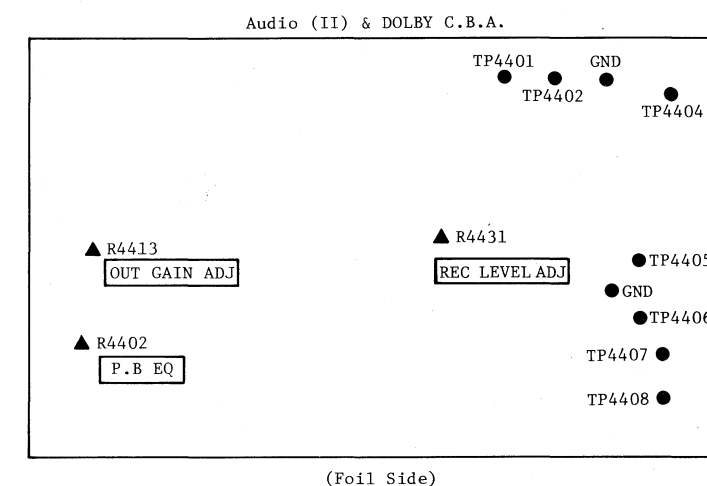


AUDIO BLOCK DIAGRAM

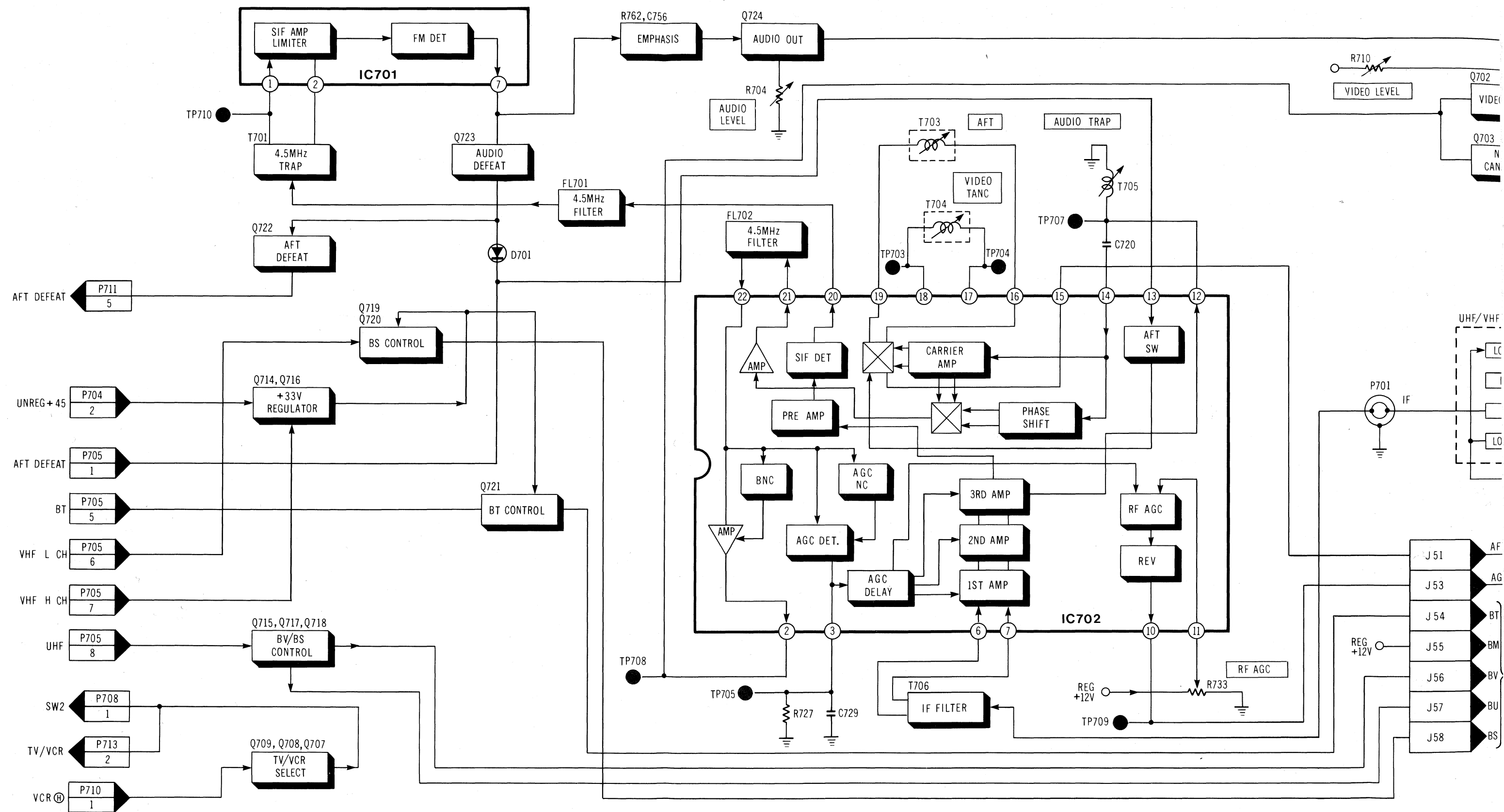


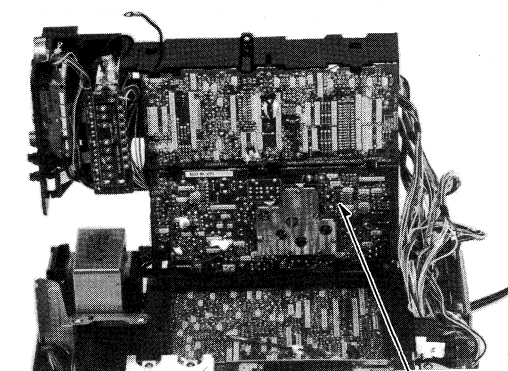
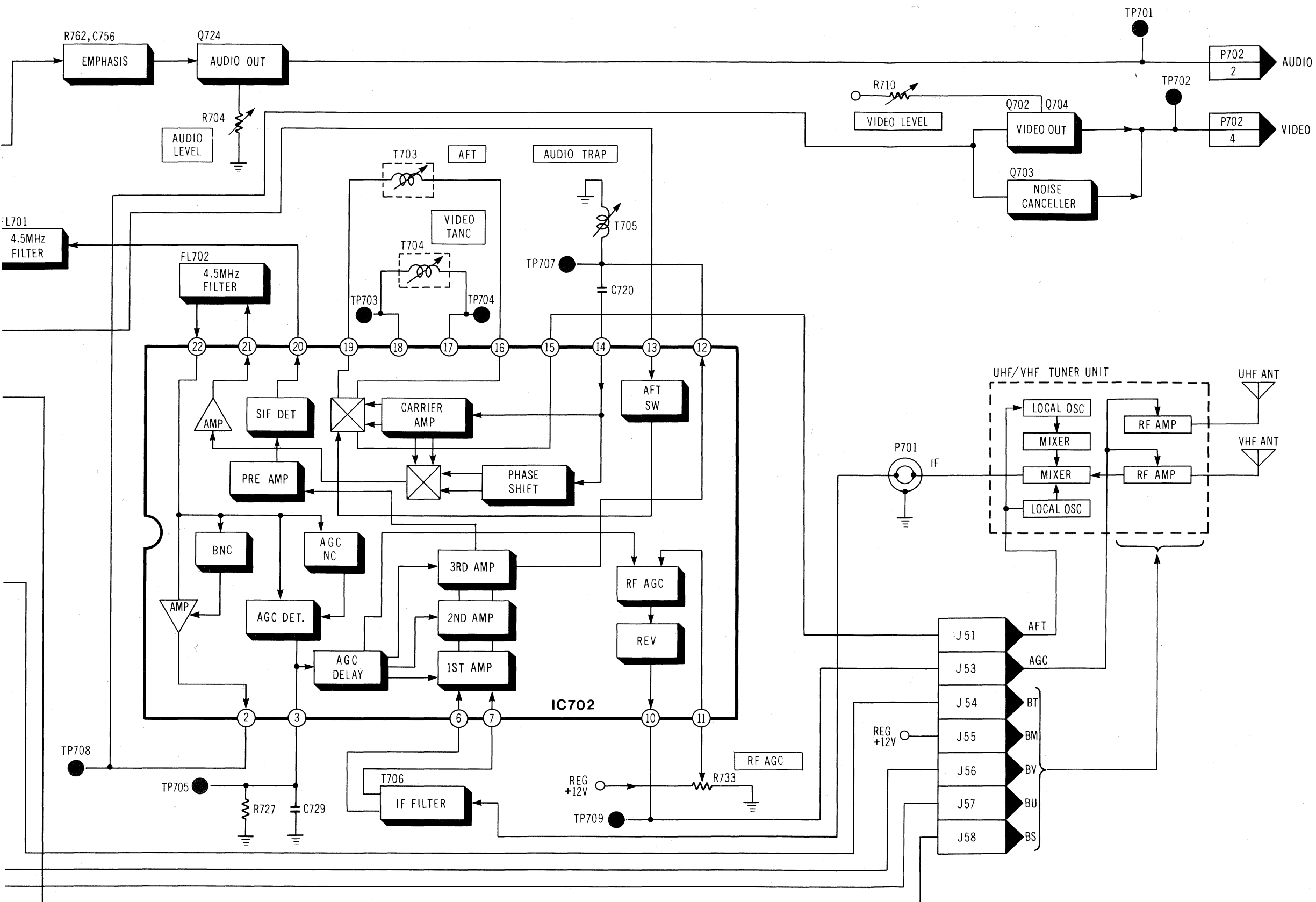


Audio Section



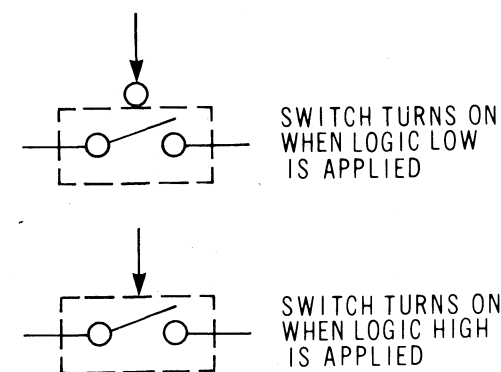
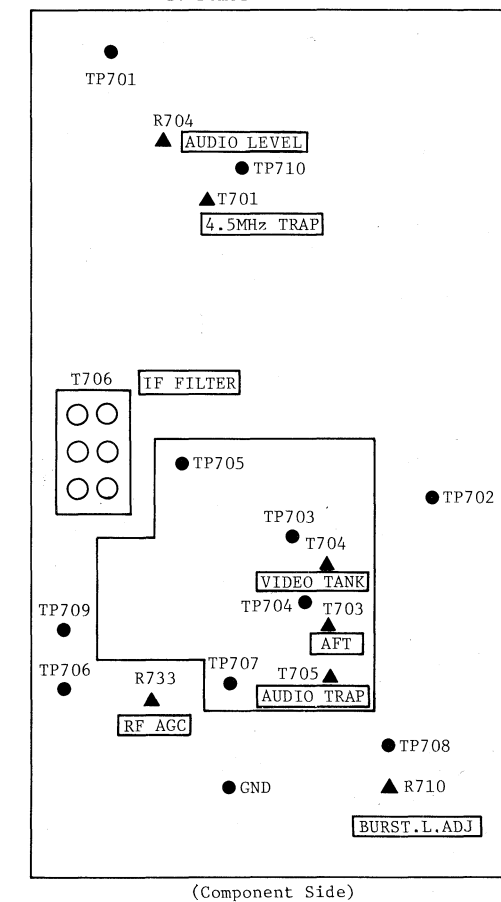
TV DEMODULATOR BLOCK DIAGRAM



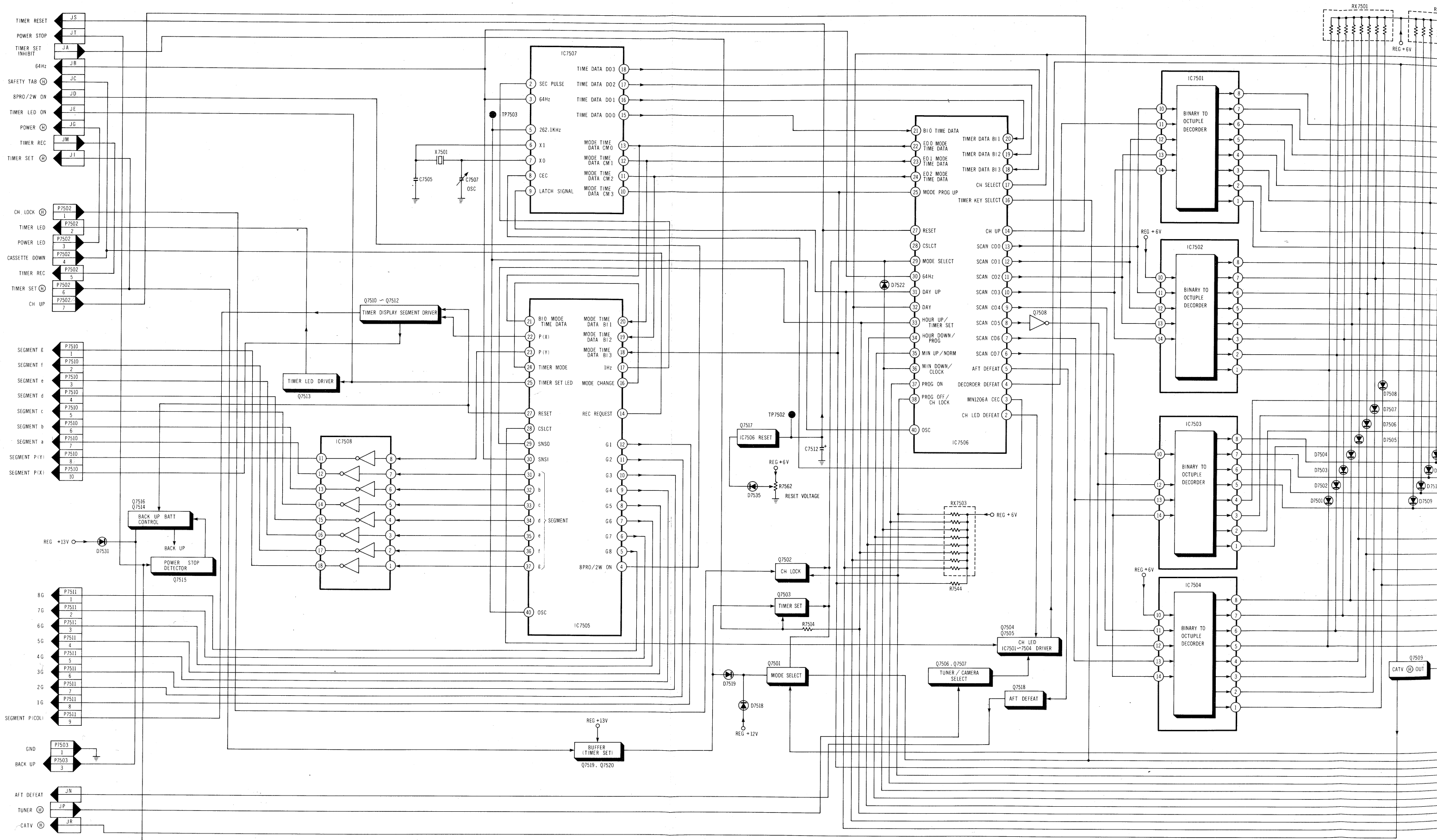


TV Demodulator Section

TV Demodulator C.B.A.

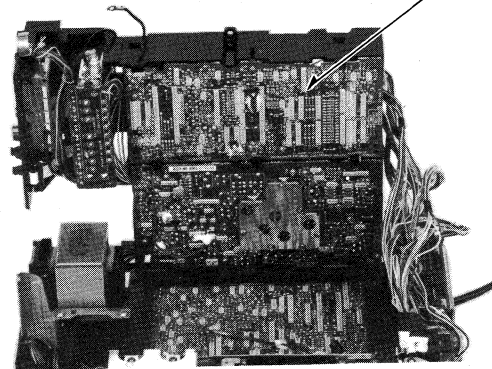


PROGRAMMABLE TIMER BLOCK DIAGRAM

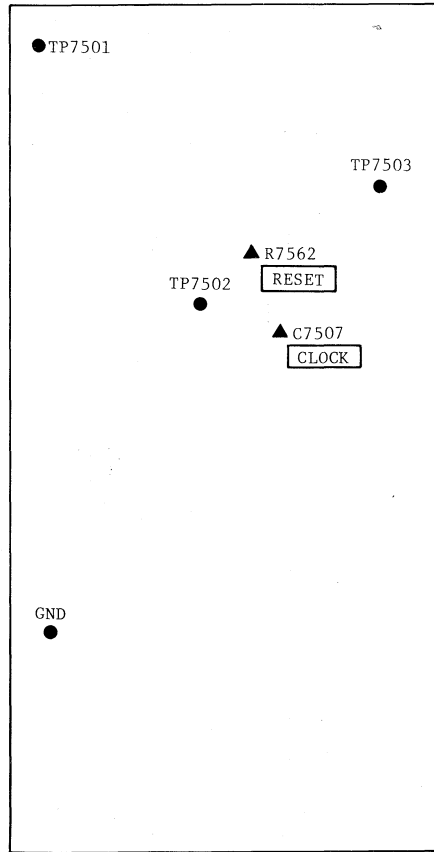


3-25 PROGRAMMABLE TIMER BLOCK DIAGRAM

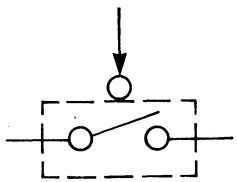
Programmable Timer Section



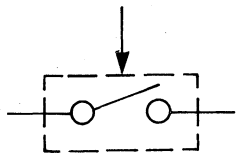
Programmable Timer C.B.A.



(Component Side)

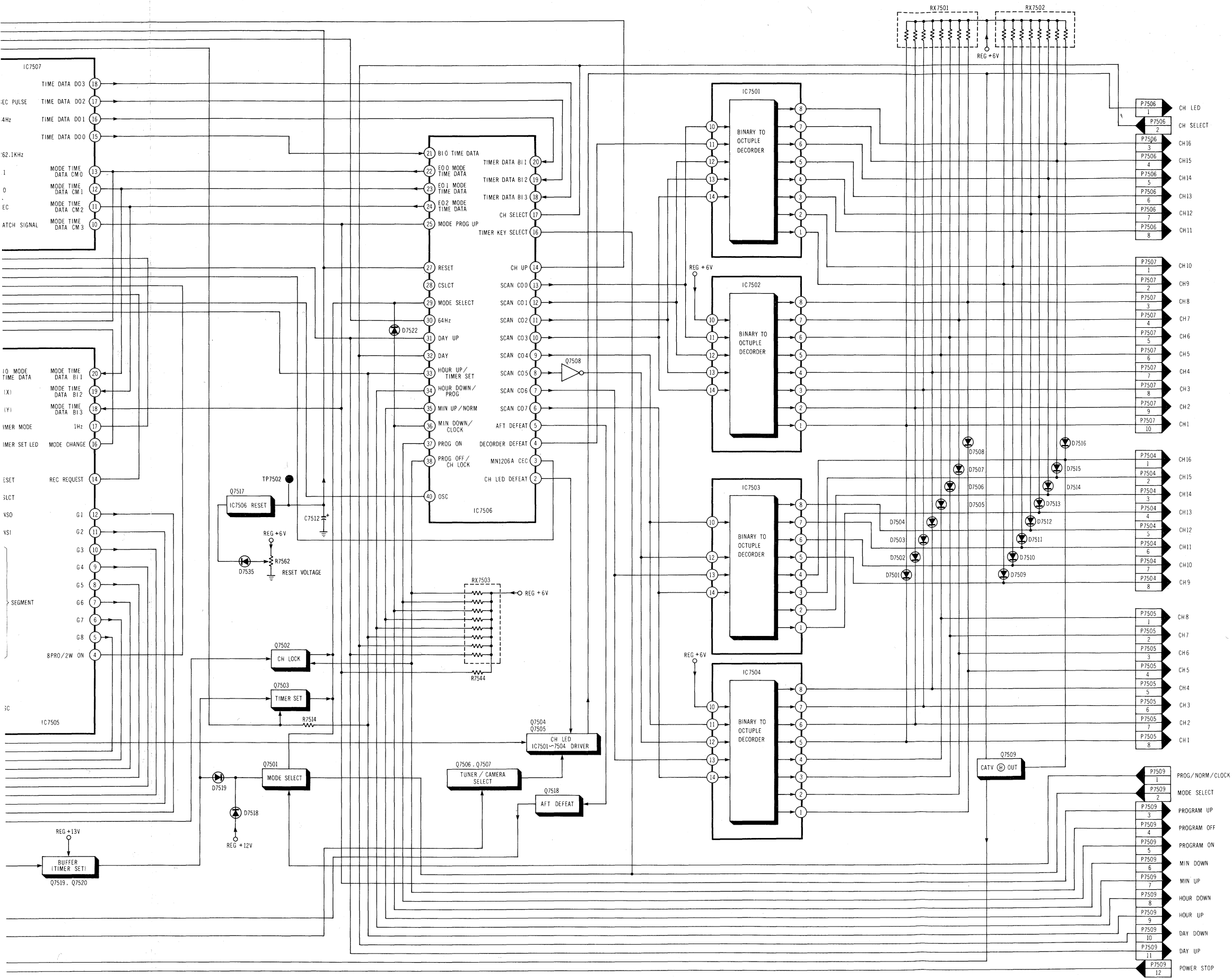


SWITCH TURNS ON
WHEN LOGIC LOW
IS APPLIED

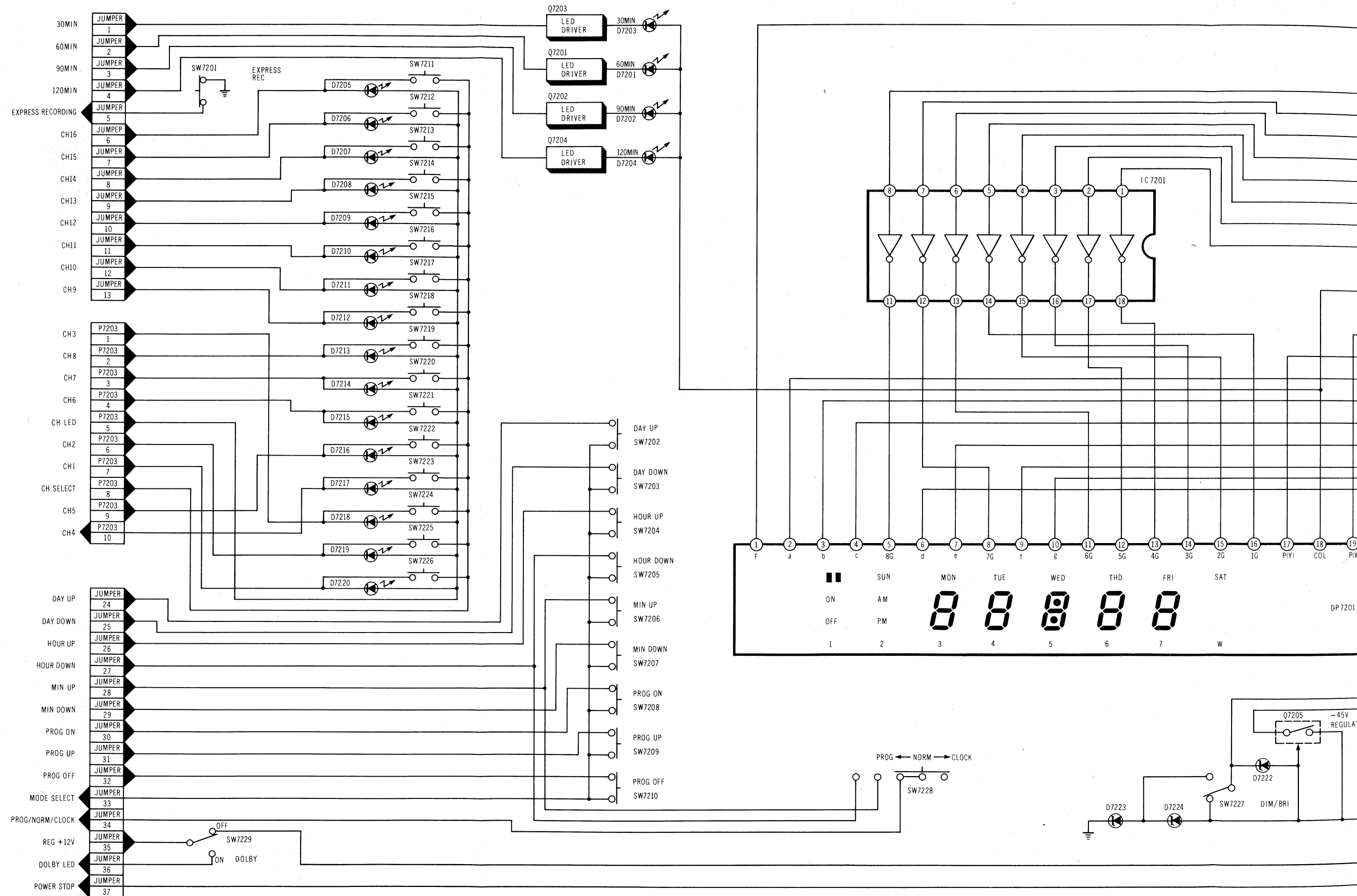


SWITCH TURNS ON
WHEN LOGIC HIGH
IS APPLIED

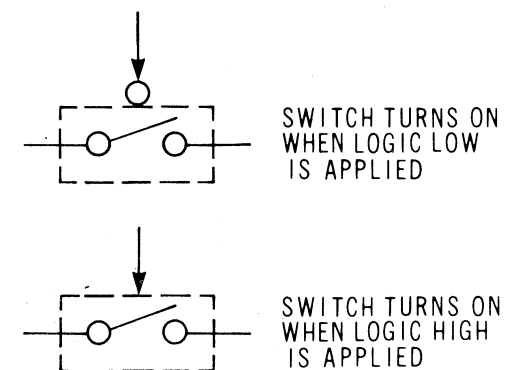
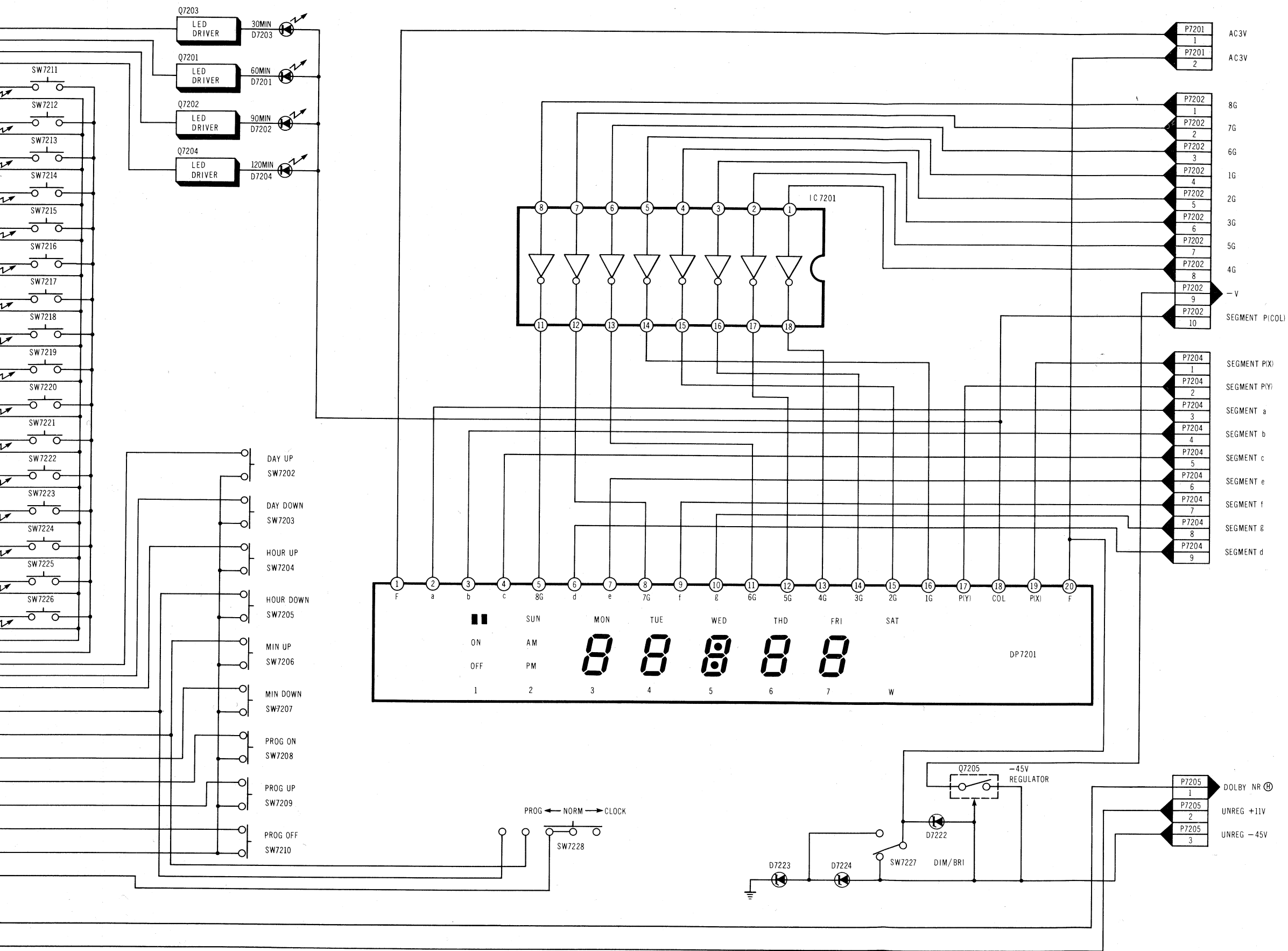
3-26 TIMER OPERATION & CHANNEL SELECT SWITCHES BLOCK DIAGRAM



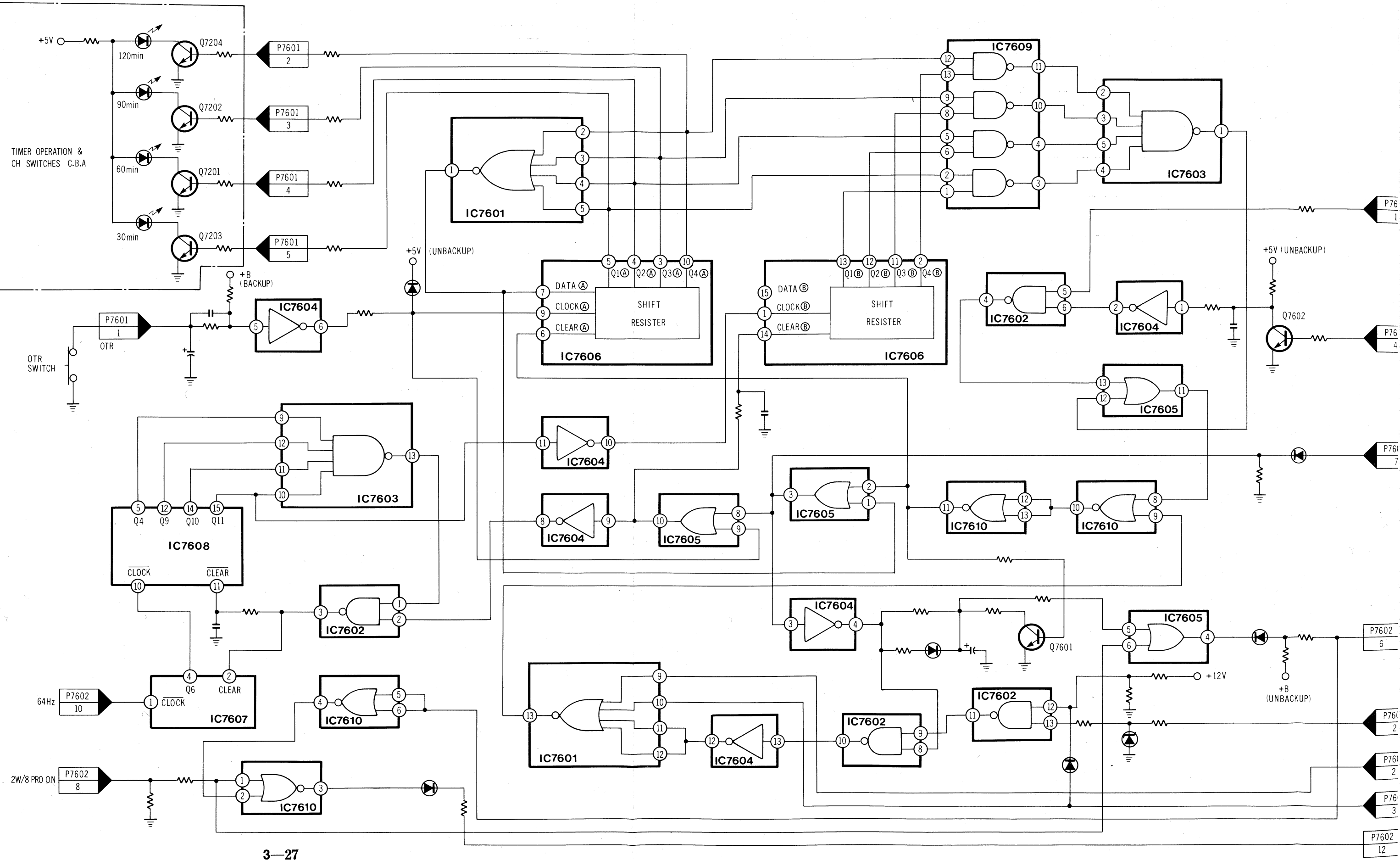
TIMER OPERATION & CHANNEL SELECT SWITCHES BLOCK DIAGRAM

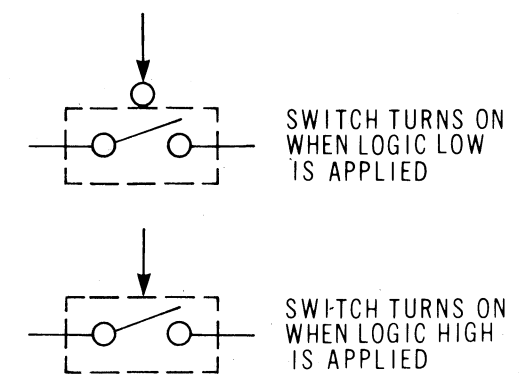
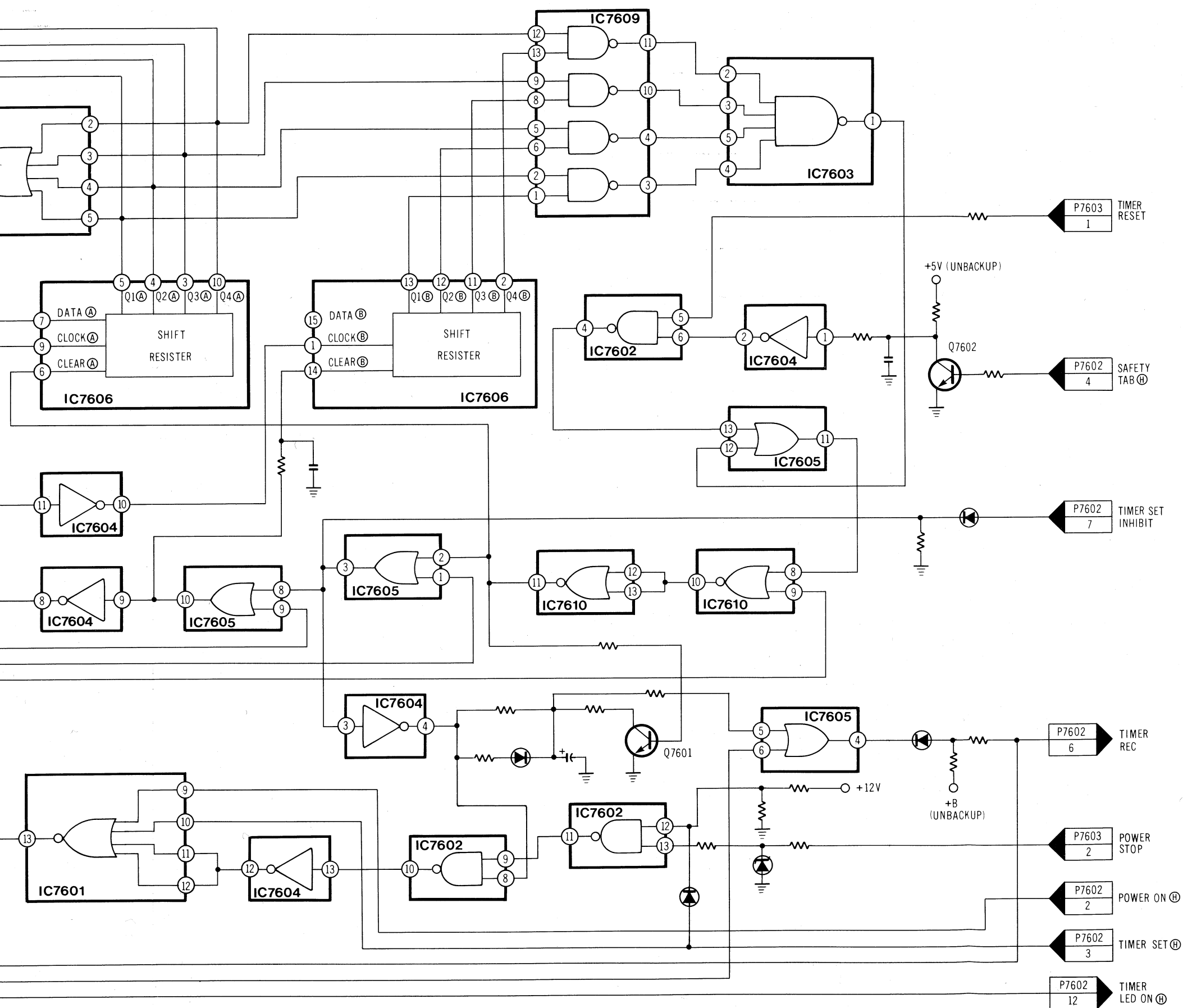


EL SELECT SWITCHES BLOCK DIAGRAM

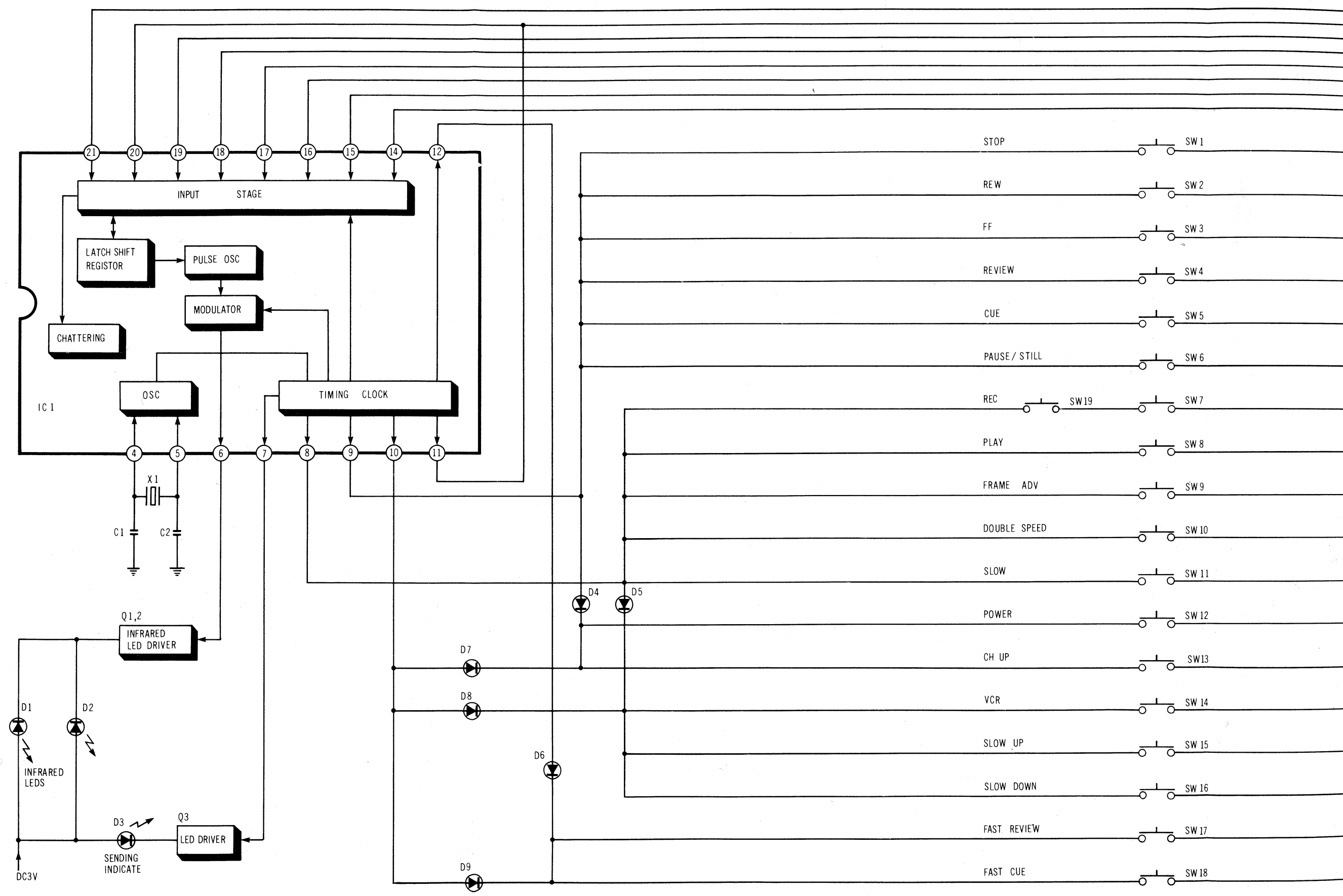


ONE TOUCH RECORDING BLOCK DIAGRAM

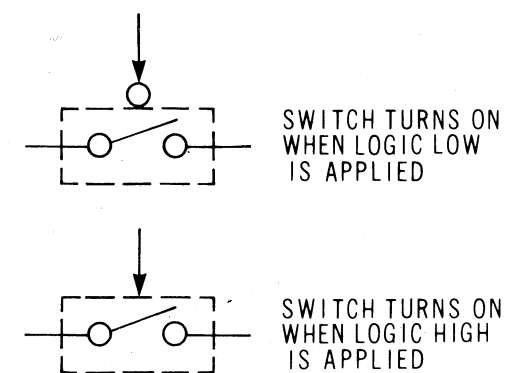
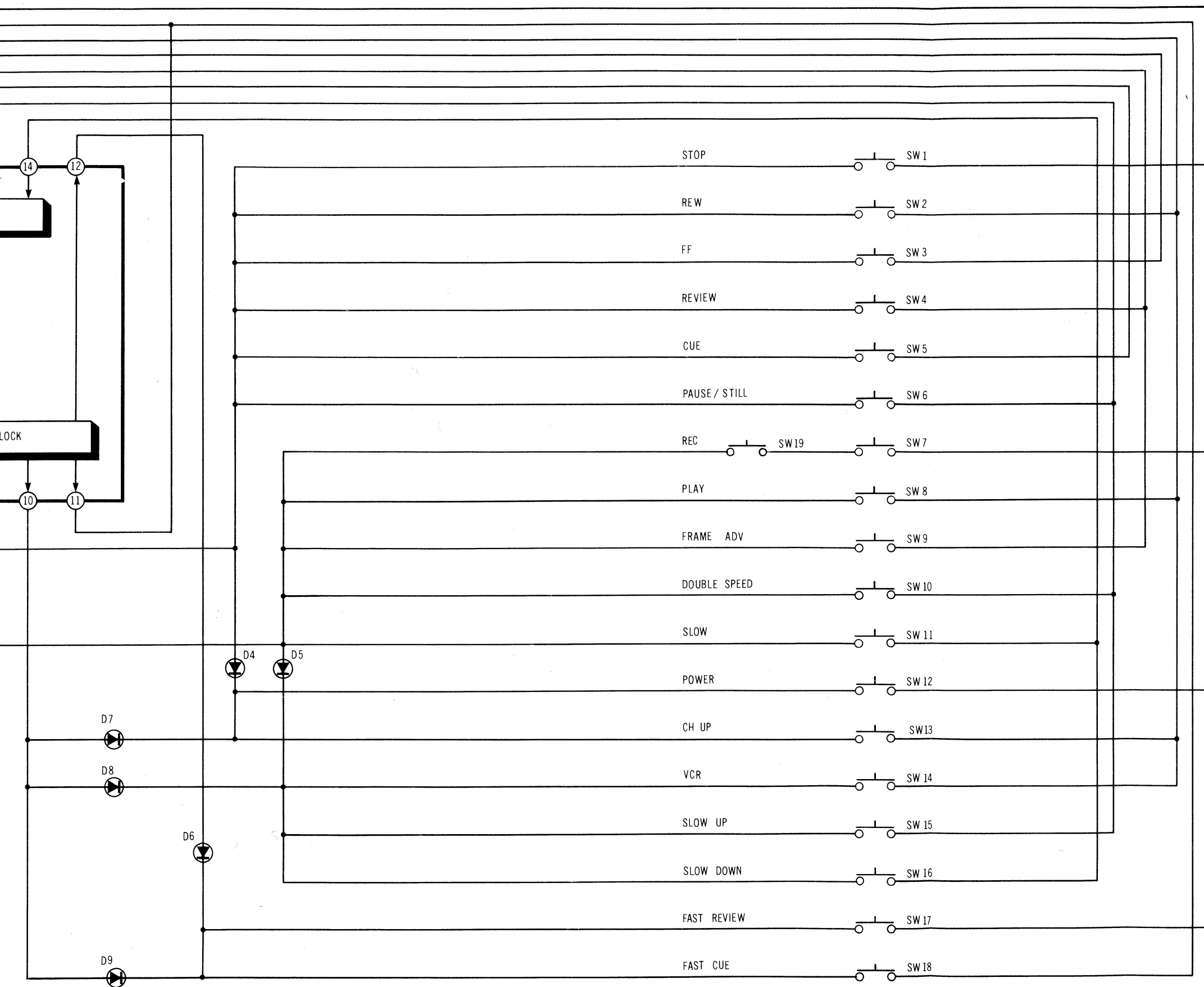




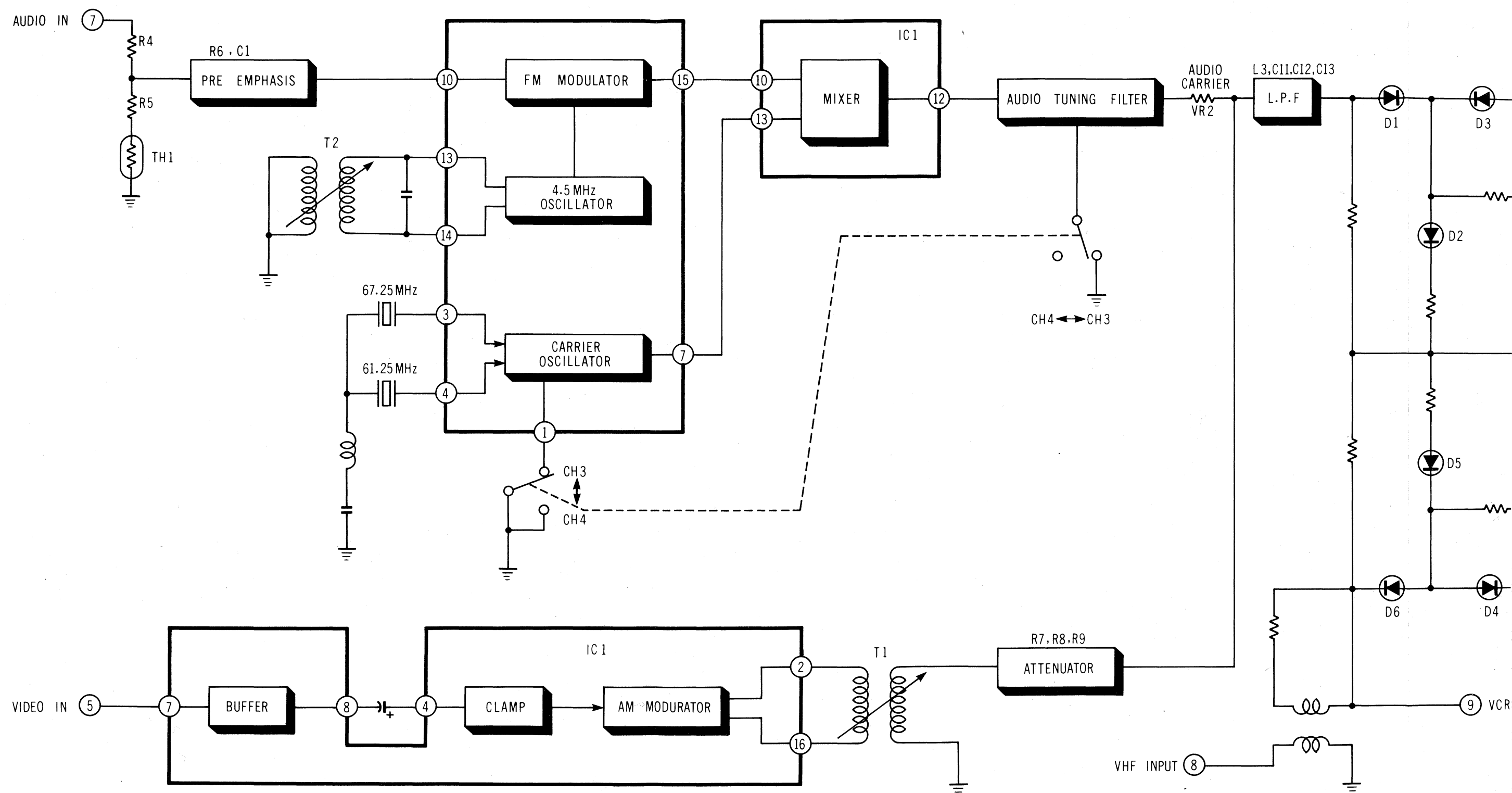
IR REMOTE CONTROL BLOCK DIAGRAM



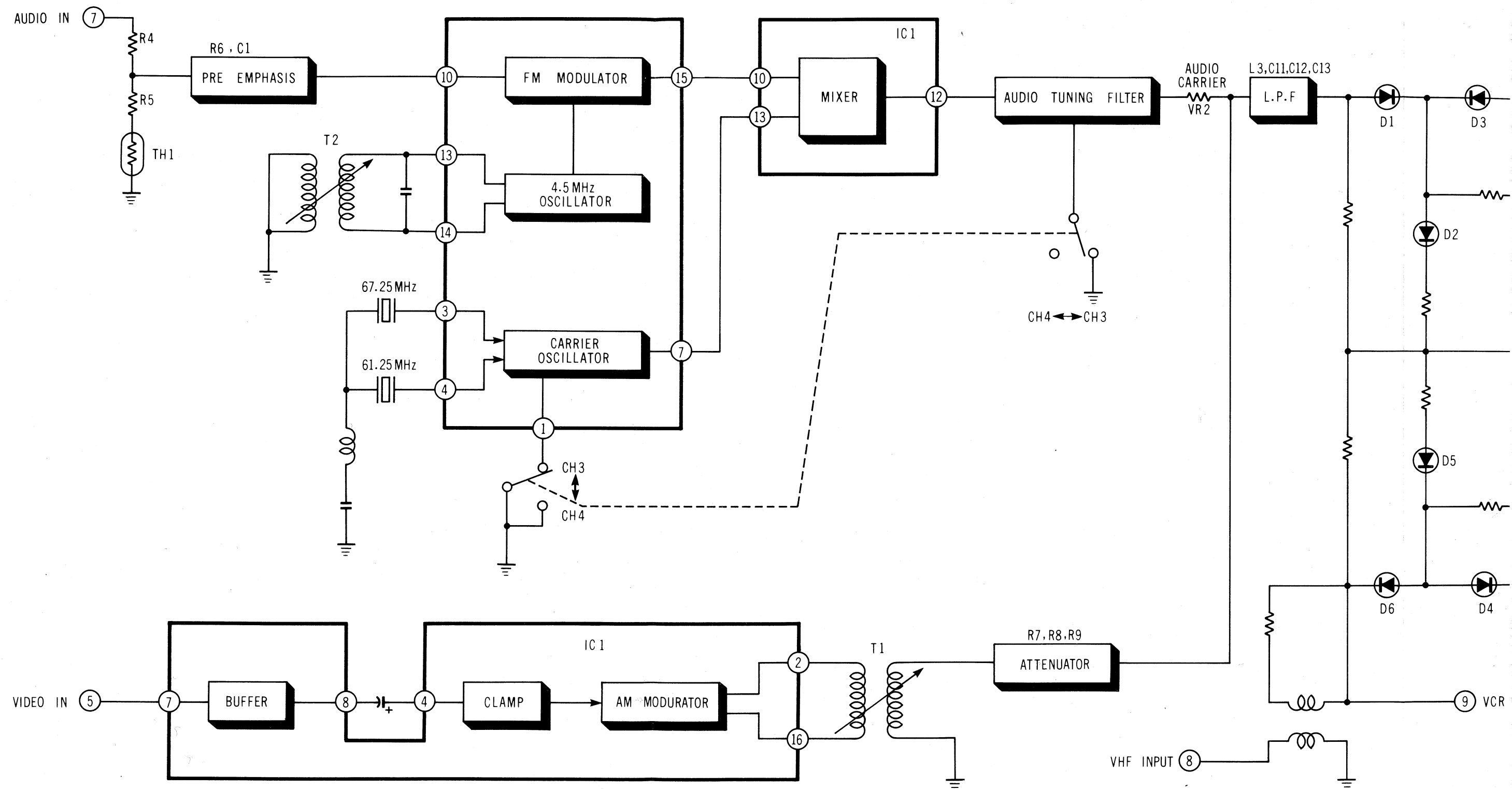
WIRE LOGIC DIAGRAM



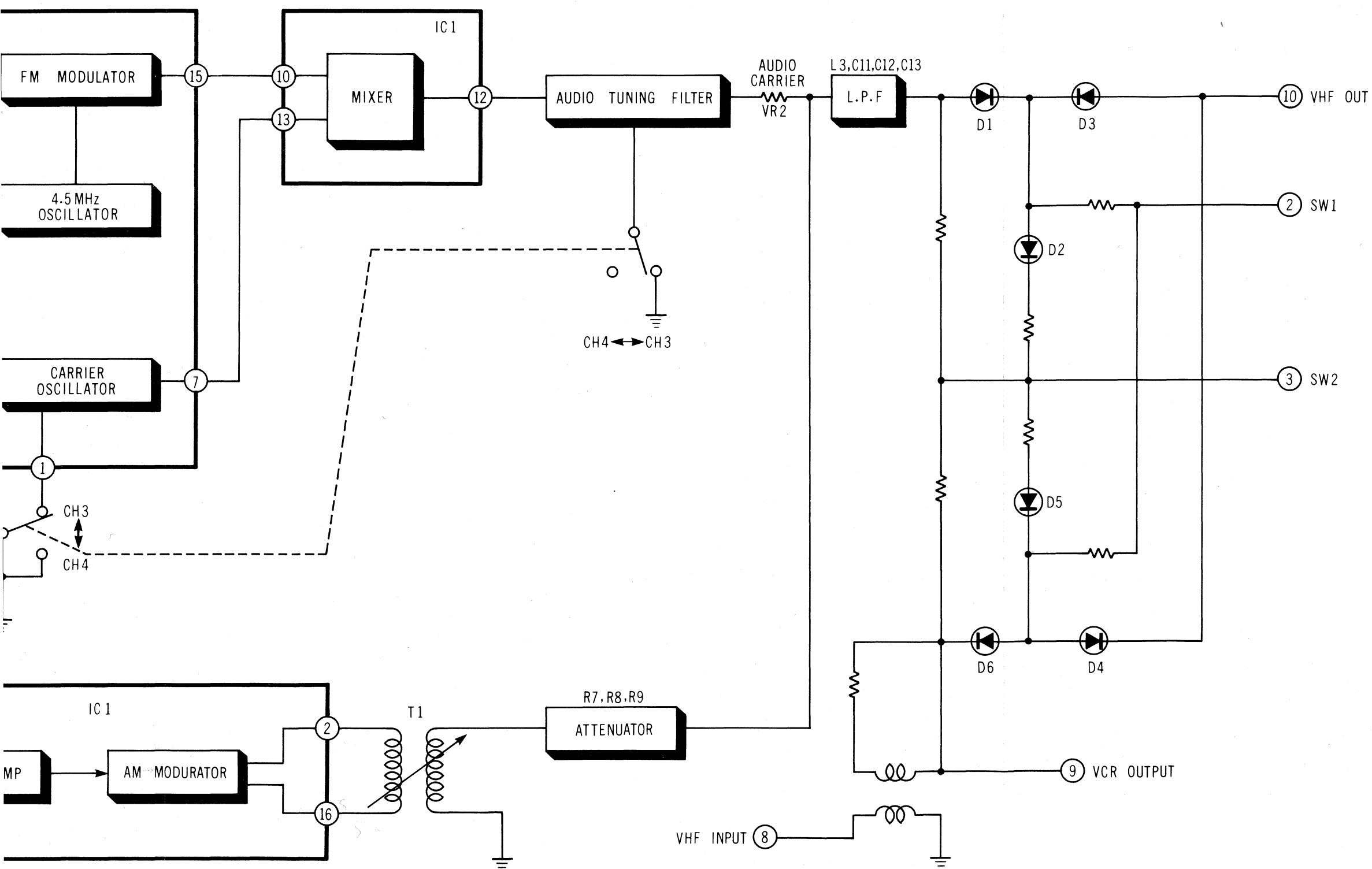
RF CONVERTER & ANTENNA TERMINAL BLOCK DIAGRAM



RF CONVERTER & ANTENNA TERMINAL BLOCK DIAGRAM



INAL BLOCK DIAGRAM

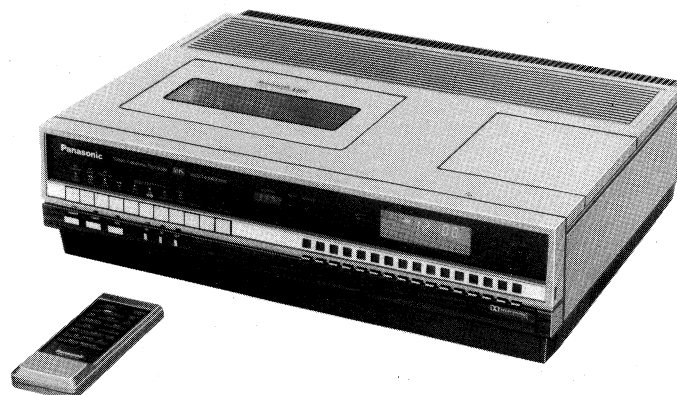


Service Manual

Video Cassette Recorder

Vol. 4
Panasonic
Omnivision **VHS**
PV-1780

Schematic Diagrams
Printed Circuit
Board Diagrams

**SPECIFICATIONS**

Power Source: 120 V AC $\pm 10\%$, 60 Hz $\pm 0.5\%$
 Power Consumption: Approx. 47 watts
 Television System: EIA Standard (525 lines, 60 fields)
 NTSC color signal

Video Recording

System: 4 rotary heads helical scanning system
 Luminance: FM azimuth recording
 Chrominance: Converted subcarrier phase shift recording

Audio Track: 2 track
 Tape Format: Tape width 1/2" (12.7 mm), high density tape

Tape Speed: SP mode: 1-5/16 i.p.s (33.35 mm/s)
 LP mode: 2 1/32 i.p.s (16.67 mm/s)
 SLP mode: 7/16 i.p.s (11.12 mm/s)

Record/Playback Time: 360 min. with NV-120 used in SLP mode

FF/REW Time: Less than 6 min with NV-T120

Heads: Video: 4 rotary heads
 Audio: 2 stationary heads/
 Control: 1 stationary head
 Erase: 1 full track erase
 1 audio track erase for audio dubbing

Input Level: Video: Video IN Jack (RCA type)
 1.0 Vp-p, 75 Ω unbalanced

Audio: MIC IN Jack (Right, left)
 -70 dB, 4 k Ω unbalanced
 Audio IN Jack (RCA type)
 -20 dB, 100 k Ω unbalanced
 TV Tuners: VHF Input: Ch2-Ch3,
 cable channels "A"-"W"
 75 Ω unbalanced
 UHF Input: UHF Ch14-Ch83,
 300 Ω balanced

Output Level: Video: Video OUT Jack (RCA type)
 1.0 Vp-p, 75 Ω unbalanced
 Audio: Audio OUT Jack (RCA type)
 (Right, left)
 -9 dB, 600 Ω unbalanced

RF Modulated: Channel 3 or 4
 72 dB μ , (Open voltage)
 75 Ω unbalanced

Video Horizontal

Resolution: Color: more than 230 lines
 B/W: more than 270 lines

Audio Frequency

Response: SP mode: 100 Hz ~ 8 kHz
 LP mode: 100 Hz ~ 6 kHz
 SLP mode: 150 Hz ~ 5 kHz (10 dB down)

Signal-to-Noise Ratio: Video: better than 40 dB
 (Rohde & Schwarz noise meter)
 Audio: SP mode: better than 42 dB
 LP mode: better than 40 dB
 SLP mode: better than 40 dB
 (Dolby NR ON)

Operation

Temperature: 41°F-104°F (5°C-40°C)

Operating Humidity: 10%-75%

Weight: 25.3 lbs (11.5 kg)

Dimensions: 18-7/8" (W) \times 14-1/4" (D) \times 5-3/8" (H)
 (480 mm \times 356 mm \times 136 mm)

Accessories Supplied:

- Blank tape
- Wireless remote control unit
- 75 Ω -300 Ω matching transformer
- 300 Ω -75 Ω matching transformer
- Coaxial cable (5 ft) with F type connectors
- Twin lead wire (5 ft)
- Dust cover
- Vertical-Lock tool

Available Tapes:

1/2" VHS video cassette tapes
 NV-T120 Approx. 810 ft. (247 m),
 2, 4 or 6 hrs.
 NV-T60 Approx. 417 ft. (127 m),
 1, 2 or 3 hrs.

Weight and dimensions shown are approximate. Specifications are subject to change without notice.

Panasonic®

Panasonic Company
 Division of Matsushita Electric
 Corporation of America
 One Panasonic Way, Secaucus,
 New Jersey 07094

Panasonic Hawaii Inc.
 91-238 Kauhū St. Ewa Beach
 P.O. Box 774
 Honolulu, Hawaii 96808-0774

Panasonic Canada
 Division of Matsushita Electric
 of Canada Limited
 5770 Ambler Drive, Mississauga,
 Ontario, L4W 2T3

Panasonic Sales Company,
 Division of Matsushita Electric
 of Puerto Rico, Inc.
 Ave. 65 De Infantería, KM 9.7
 Victoria Industrial Park
 Carolina, Puerto Rico 00630

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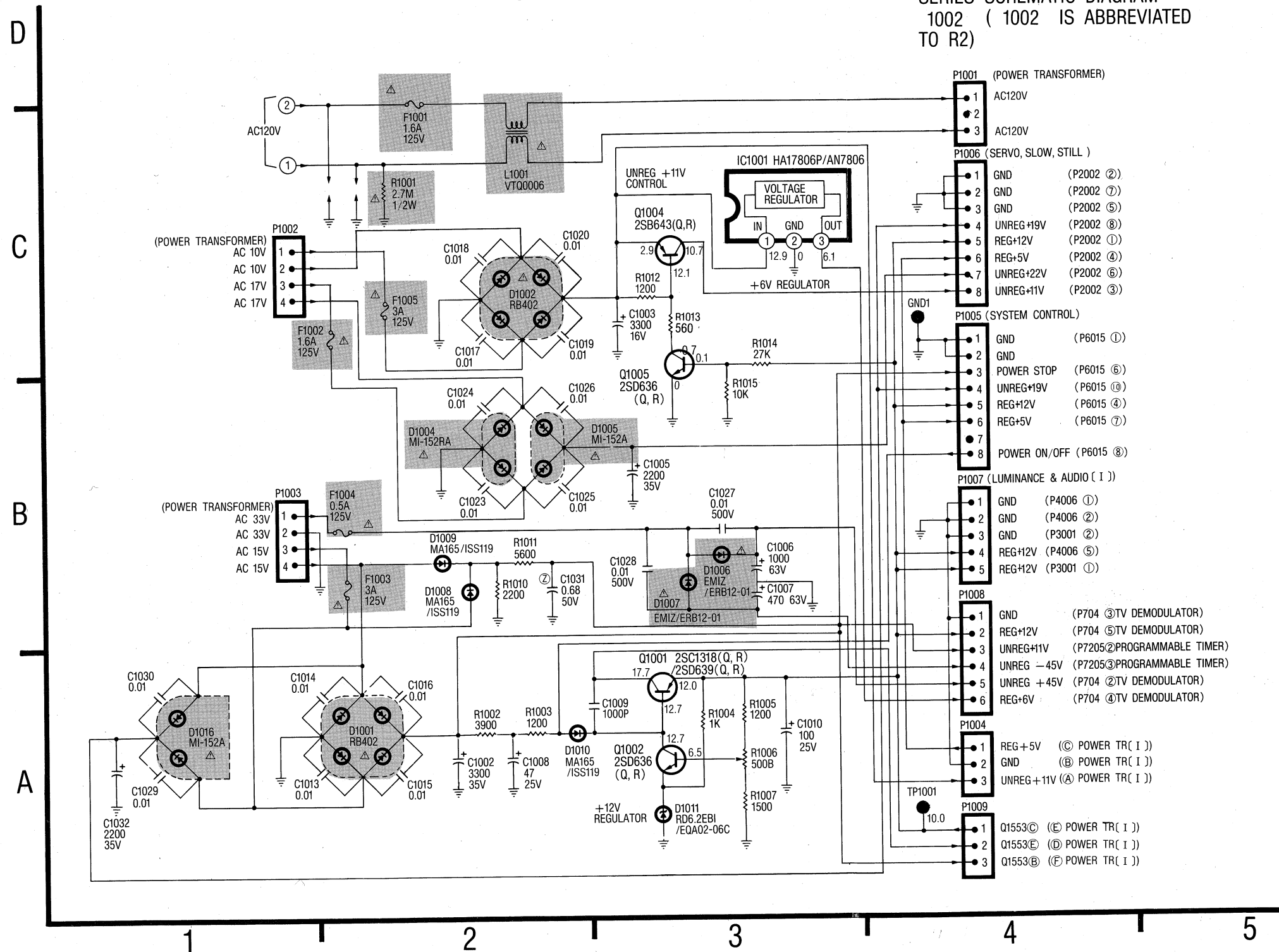
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POWER SUPPLY SCHEMATIC DIAGRAM

VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL IN
SP STOP MODE.

IMPORTANT SAFETY NOTICE :
COMPONENTS IDENTIFIED BY THE SIGN Δ HAVE
SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY.
WHEN REPLACING ANY OF THESE COMPONENTS, USE
ONLY THE SPECIFIED PARTS.

NOTE : REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
EXAMPLE : C.B.A.R2, REF. NO. 1000
SERIES SCHEMATIC DIAGRAM.....
1002 (1002 IS ABBREVIATED
TO R2)



P1001 (POWER SUPPLY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	AC 120V	POWER TRANSFORMER
2		
3	AC 120V	POWER TRANSFORMER

P1002 (POWER SUPPLY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	AC 10V	POWER TRANSFORMER
2	AC 10V	POWER TRANSFORMER
3	AC 17V	POWER TRANSFORMER
4	AC 17V	POWER TRANSFORMER

P1003 (POWER SUPPLY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	AC 33V	POWER TRANSFORMER
2	AC 33V	POWER TRANSFORMER
3	AC 15V	POWER TRANSFORMER
4	AC 15V	POWER TRANSFORMER

P1004 (POWER SUPPLY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	REG +5V	Ⓒ POWER TRANSISTOR [II] C.B.A.
2	GND	Ⓓ POWER TRANSISTOR [II] C.B.A.
3	UNREG +11V	Ⓔ POWER TRANSISTOR [II] C.B.A.

P1005 (POWER SUPPLY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P6015-1 SYSTEM CONTROL C.B.A.
2	GND	
3	POWER STOP	P6015-6 SYSTEM CONTROL C.B.A.
4	UNREG +19V	P6015-10 SYSTEM CONTROL C.B.A.
5	REG +12V	P6015-4 SYSTEM CONTROL C.B.A.
6	REG +5V	P6015-7 SYSTEM CONTROL C.B.A.
7		
8	POWER ON/OFF	P6015-8 SYSTEM CONTROL C.B.A.

P1006 (POWER SUPPLY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P2002-2 SERVO, SLOW STILL & CHROMINANCE C.B.A.
2	GND	P2002-7 SERVO, SLOW STILL & CHROMINANCE C.B.A.
3	GND	P2002-5 SERVO, SLOW STILL & CHROMINANCE C.B.A.
4	UNRED +19V	P2002-8 SERVO, SLOW STILL & CHROMINANCE C.B.A.
5	REG +12V	P2002-1 SERVO, SLOW STILL & CHROMINANCE C.B.A.
6	REG +5V	P2002-4 SERVO, SLOW STILL & CHROMINANCE C.B.A.
7	UNREG +22V	P2002-6 SERVO, SLOW STILL & CHROMINANCE C.B.A.
8	UNREG +11V	P2002-3 SERVO, SLOW STILL & CHROMINANCE C.B.A.

P1007 (POWER SUPPLY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P4006-1 LUMINANCE & AUDIO [I] C.B.A.
2	GND	P4006-2 LUMINANCE & AUDIO [I] C.B.A.
3	GND	P3001-2 LUMINANCE & AUDIO [I] C.B.A.
4	REG +12V	P4006-5 LUMINANCE & AUDIO [I] C.B.A.
5	REG +12V	P3001-1 LUMINANCE & AUDIO [I] C.B.A.

P1008 (POWER SUPPLY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P704-3 TV DEMODULATOR C.B.A.
2	REG +12V	P704-5 TV DEMODULATOR C.B.A.
3	UNREG +11V	P7205-2 PROGRAMMABLE TIMER C.B.A.
4	UNREG +45V	P7205-3 PROGRAMMABLE TIMER C.B.A.
5	UNREG +45V	P704-2 TV DEMODULATOR C.B.A.
6	REG +6V	P704-4 TV DEMODULATOR C.B.A.

P1009 (POWER SUPPLY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	Q1553 C	Ⓔ POWER TRANSISTOR [II] C.B.A.
2	Q1553 E	Ⓓ POWER TRANSISTOR [II] C.B.A.
3	Q1553 B	Ⓒ POWER TRANSISTOR [II] C.B.A.

4-1 POWER SUPPLY
OPERATION

P1001 (POWER SUPPLY C.B.A.)	
NAME	DESTINATION
	POWER TRANSFORMER
	POWER TRANSFORMER

P1002 (POWER SUPPLY C.B.A.)	
NAME	DESTINATION
	POWER TRANSFORMER
	POWER TRANSFORMER
	POWER TRANSFORMER
	POWER TRANSFORMER

P1003 (POWER SUPPLY C.B.A.)	
NAME	DESTINATION
	POWER TRANSFORMER
	POWER TRANSFORMER
	POWER TRANSFORMER
	POWER TRANSFORMER

P1004 (POWER SUPPLY C.B.A.)	
NAME	DESTINATION
	Ⓒ POWER TRANSISTOR [II] C.B.A.
	Ⓓ POWER TRANSISTOR [II] C.B.A.
IV	Ⓐ POWER TRANSISTOR [II] C.B.A.

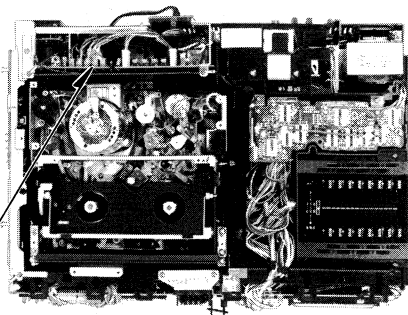
P1005 (POWER SUPPLY C.B.A.)	
NAME	DESTINATION
	P6015-1 SYSTEM CONTROL C.B.A.
OP	P6015-6 SYSTEM CONTROL C.B.A.
9V	P6015-10 SYSTEM CONTROL C.B.A.
	P6015-4 SYSTEM CONTROL C.B.A.
	P6015-7 SYSTEM CONTROL C.B.A.
Y/OFF	P6015-8 SYSTEM CONTROL C.B.A.

P1006 (POWER SUPPLY C.B.A.)	
NAME	DESTINATION
	P2002-2 SERVO, SLOW STILL & CHROMINANCE C.B.A.
	P2002-7 SERVO, SLOW STILL & CHROMINANCE C.B.A.
	P2002-5 SERVO, SLOW STILL & CHROMINANCE C.B.A.
	P2002-8 SERVO, SLOW STILL & CHROMINANCE C.B.A.
9V	P2002-1 SERVO, SLOW STILL & CHROMINANCE C.B.A.
	P2002-4 SERVO, SLOW STILL & CHROMINANCE C.B.A.
2V	P2002-6 SERVO, SLOW STILL & CHROMINANCE C.B.A.
IV	P2002-3 SERVO, SLOW STILL & CHROMINANCE C.B.A.

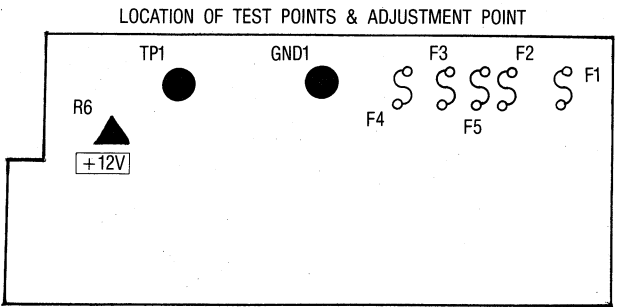
P1007 (POWER SUPPLY C.B.A.)	
NAME	DESTINATION
	P4006-1 LUMINANCE & AUDIO [I] C.B.A.
	P4006-2 LUMINANCE & AUDIO [I] C.B.A.
	P3001-2 LUMINANCE & AUDIO [I] C.B.A.
	P4006-5 LUMINANCE & AUDIO [I] C.B.A.
	P3001-1 LUMINANCE & AUDIO [I] C.B.A.

P1008 (POWER SUPPLY C.B.A.)	
NAME	DESTINATION
	P704-3 TV DEMODULATOR C.B.A.
	P704-5 TV DEMODULATOR C.B.A.
	P7205-2 PROGRAMMABLE TIMER C.B.A.
5V	P7205-3 PROGRAMMABLE TIMER C.B.A.
5V	P704-2 TV DEMODULATOR C.B.A.
	P704-4 TV DEMODULATOR C.B.A.


P1009 (POWER SUPPLY C.B.A.)	
NAME	DESTINATION
	Ⓔ POWER TRANSISTOR [II] C.B.A.
	Ⓕ POWER TRANSISTOR [II] C.B.A.
	Ⓖ POWER TRANSISTOR [II] C.B.A.



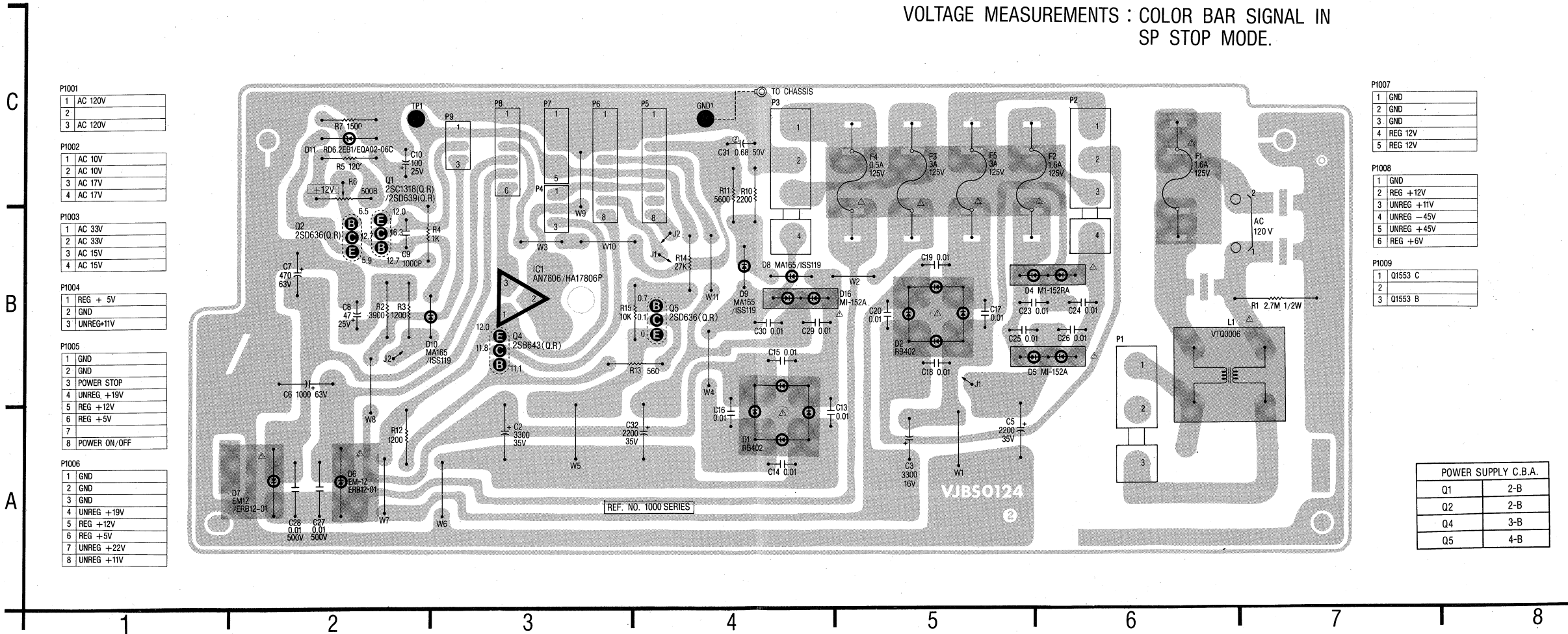
POWER SUPPLY C.B.A.



POWER SUPPLY C.B.A. VEPS0124A

IMPORTANT SAFETY NOTICE :
COMPONENTS IDENTIFIED BY THE SIGN  HAVE
SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY.
WHEN REPLACING ANY OF THESE COMPONENTS, USE
ONLY THE SPECIFIED PARTS.

VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL IN
SP STOP MODE.



P1007	
1	GND
2	GND
3	GND
4	REG +12V
5	REG +12V

P1008	
1	GND
2	REG +12V
3	UNREG +11V
4	UNREG -45V
5	UNREG +45V
6	REG +6V

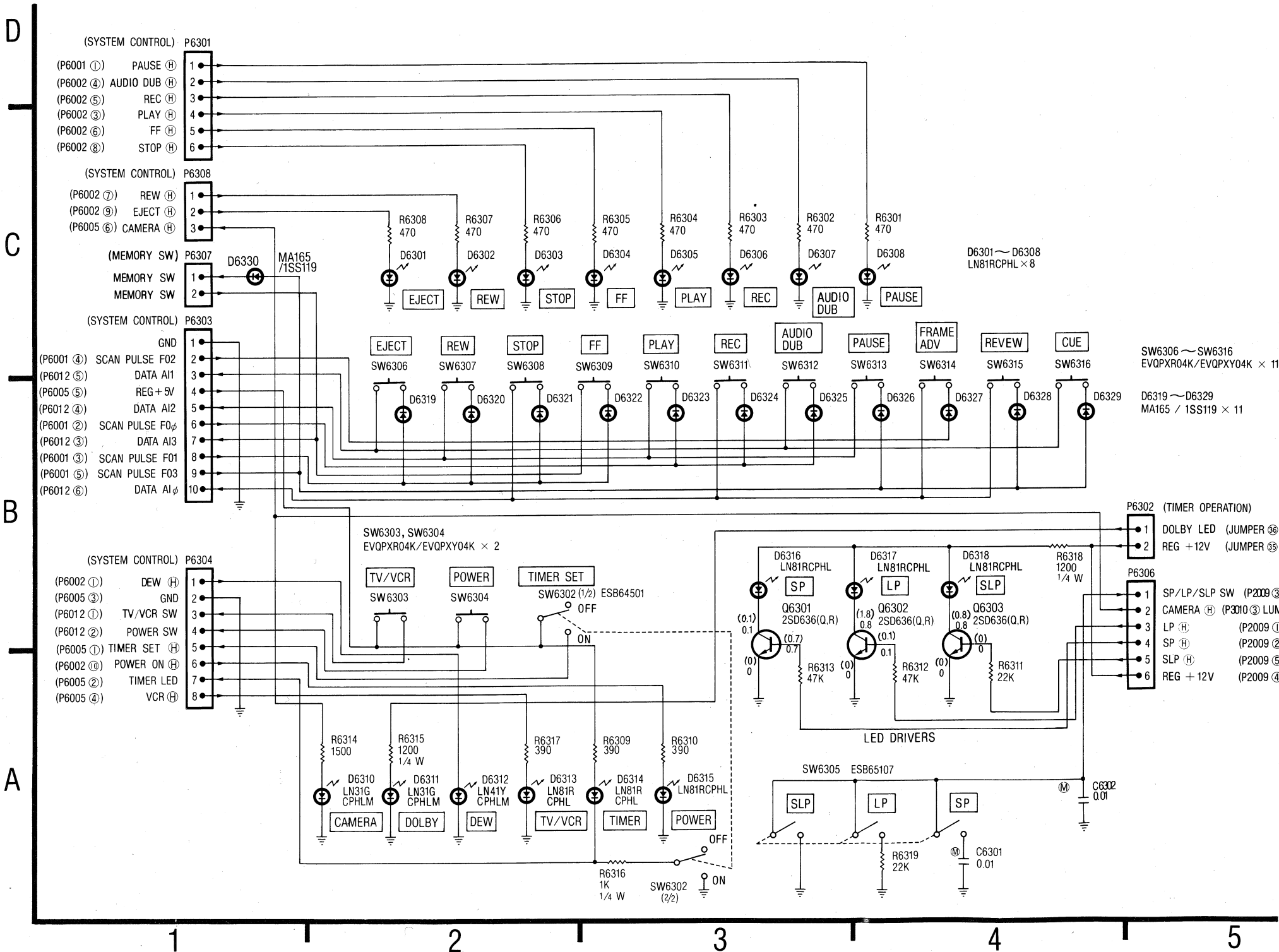
P1009	
1	Q1553 C
2	
3	Q1553 B

POWER SUPPLY C.B.A.	
Q1	2-B
Q2	2-B
Q4	3-B
Q5	4-B

OPERATION SCHEMATIC DIAGRAM

NOTE : REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
EXAMPLE : C.B.A.....R2, REF. NO. 6300
SERIES SCHEMATIC DIAGRAM.....
6302 (6302 IS ABBREVIATED
TO R2)

VOLTAGE MEASUREMENT :
COLOR BAR SIGNAL IN SP REC MODE WITH IN
BRACKET.
COLOR BAR SIGNAL IN SP PLAY MODE WITH OUT
BRACKET.



P6301 (OPERATION C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	PAUSE (H)	P6001-1 SYSTEM CONTROL C.B.A.
2	AUDIO DUB (H)	P6002-4 SYSTEM CONTROL C.B.A.
3	REC (H)	P6002-5 SYSTEM CONTROL C.B.A.
4	PLAY (H)	P6002-3 SYSTEM CONTROL C.B.A.
5	FF (H)	P6002-6 SYSTEM CONTROL C.B.A.
6	STOP (H)	P6002-8 SYSTEM CONTROL C.B.A.

P6302 (OPERATION C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	DOLBY LED	JUMPER-36 TIMER OPERATION C.B.A.
2	REG +12V	JUMPER-35 TIMER OPERATION C.B.A.

P6303 (OPERATION C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P6001-4 SYSTEM CONTROL C.B.A.
2	SCAN PULSE F02	P6012-5 SYSTEM CONTROL C.B.A.
3	DATA AI1	P6005-5 SYSTEM CONTROL C.B.A.
4	REG +5V	P6012-4 SYSTEM CONTROL C.B.A.
5	DATA AI2	P6001-2 SYSTEM CONTROL C.B.A.
6	SCAN PULSE F01	P6012-3 SYSTEM CONTROL C.B.A.
7	DATA AI3	P6001-3 SYSTEM CONTROL C.B.A.
8	SCAN PULSE F01	P6001-5 SYSTEM CONTROL C.B.A.
9	SCAN PULSE F03	P6012-6 SYSTEM CONTROL C.B.A.
10	DATA AI4	

P6304 (OPERATION C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	DEW (H)	P6002-1 SYSTEM CONTROL C.B.A.
2	GND	P6005-3 SYSTEM CONTROL C.B.A.
3	TV/VCR SW	P6012-1 SYSTEM CONTROL C.B.A.
4	POWER SW	P6012-2 SYSTEM CONTROL C.B.A.
5	TIMER SET (H)	P6005-1 SYSTEM CONTROL C.B.A.
6	POWER ON (H)	P6002-10 SYSTEM CONTROL C.B.A.
7	TIMER LED	P6005-2 SYSTEM CONTROL C.B.A.
8	VCR (H)	P6005-4 SYSTEM CONTROL C.B.A.

P6306 (OPERATION C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	SP/LP/SLP SW	P2009-3 SERVO C.B.A.
2	CAMERA (H)	P3010-3 LUMINANCE C.B.A.
3	LP (H)	P2009-1 SERVO C.B.A.
4	SP (H)	P2009-2 SERVO C.B.A.
5	SLP (H)	P2009-5 SERVO C.B.A.
6	REG +12V	P2009-4 SERVO C.B.A.

P6307 (OPERATION C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	MEMORY SW	MEMORY SW C.B.A.
2	MEMORY SW	MEMORY SW C.B.A.

P6308 (OPERATION C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	REW (H)	P6002-7 SYSTEM CONTROL C.B.A.
2	EJECT (H)	P6002-9 SYSTEM CONTROL C.B.A.
3	CAMERA (H)	P6005-6 SYSTEM CONTROL C.B.A.

P6301 (OPERATION C.B.A.)	
SIGNAL NAME	DESTINATION
E (H)	P6001-1 SYSTEM CONTROL C.B.A.
DUB (H)	P6002-4 SYSTEM CONTROL C.B.A.
(H)	P6002-5 SYSTEM CONTROL C.B.A.
(H)	P6002-3 SYSTEM CONTROL C.B.A.
(H)	P6002-6 SYSTEM CONTROL C.B.A.
(H)	P6002-8 SYSTEM CONTROL C.B.A.

P6302 (OPERATION C.B.A.)	
SIGNAL NAME	DESTINATION
Y LED	JUMPER-36 TIMER OPERATION C.B.A.
+12V	JUMPER-35 TIMER OPERATION C.B.A.

P6303 (OPERATION C.B.A.)	
SIGNAL NAME	DESTINATION
PULSE F02	P6001-4 SYSTEM CONTROL C.B.A.
A1	P6012-5 SYSTEM CONTROL C.B.A.
+5V	P6005-5 SYSTEM CONTROL C.B.A.
A12 I2	P6012-4 SYSTEM CONTROL C.B.A.
PULSE F0φ	P6001-2 SYSTEM CONTROL C.B.A.
A13	P6012-3 SYSTEM CONTROL C.B.A.
PULSE F01	P6001-3 SYSTEM CONTROL C.B.A.
PULSE F03	P6001-5 SYSTEM CONTROL C.B.A.
A1φ	P6012-6 SYSTEM CONTROL C.B.A.

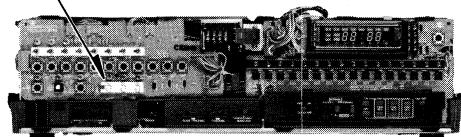
P6304 (OPERATION C.B.A.)	
SIGNAL NAME	DESTINATION
(H)	P6002-1 SYSTEM CONTROL C.B.A.
	P6005-3 SYSTEM CONTROL C.B.A.
CR SW	P6012-1 SYSTEM CONTROL C.B.A.
R SET (H)	P6005-1 SYSTEM CONTROL C.B.A.
R ON (H)	P6002-10 SYSTEM CONTROL C.B.A.
R LED	P6005-2 SYSTEM CONTROL C.B.A.
(H)	P6005-4 SYSTEM CONTROL C.B.A.

P6306 (OPERATION C.B.A.)	
SIGNAL NAME	DESTINATION
P/SLP SW	P2009-3 SERVO C.B.A.
RA (H)	P3010-3 LUMINANCE C.B.A.
(H)	P2009-1 SERVO C.B.A.
(H)	P2009-2 SERVO C.B.A.
+12V	P2009-5 SERVO C.B.A.
	P2009-4 SERVO C.B.A.

P6307 (OPERATION C.B.A.)	
SIGNAL NAME	DESTINATION
MEMORY SW	MEMORY SW C.B.A.
RY SW	MEMORY SW C.B.A.

P6308 (OPERATION C.B.A.)	
SIGNAL NAME	DESTINATION
(H)	P6002-7 SYSTEM CONTROL C.B.A.
(H)	P6002-9 SYSTEM CONTROL C.B.A.
RA (H)	P6005-6 SYSTEM CONTROL C.B.A.

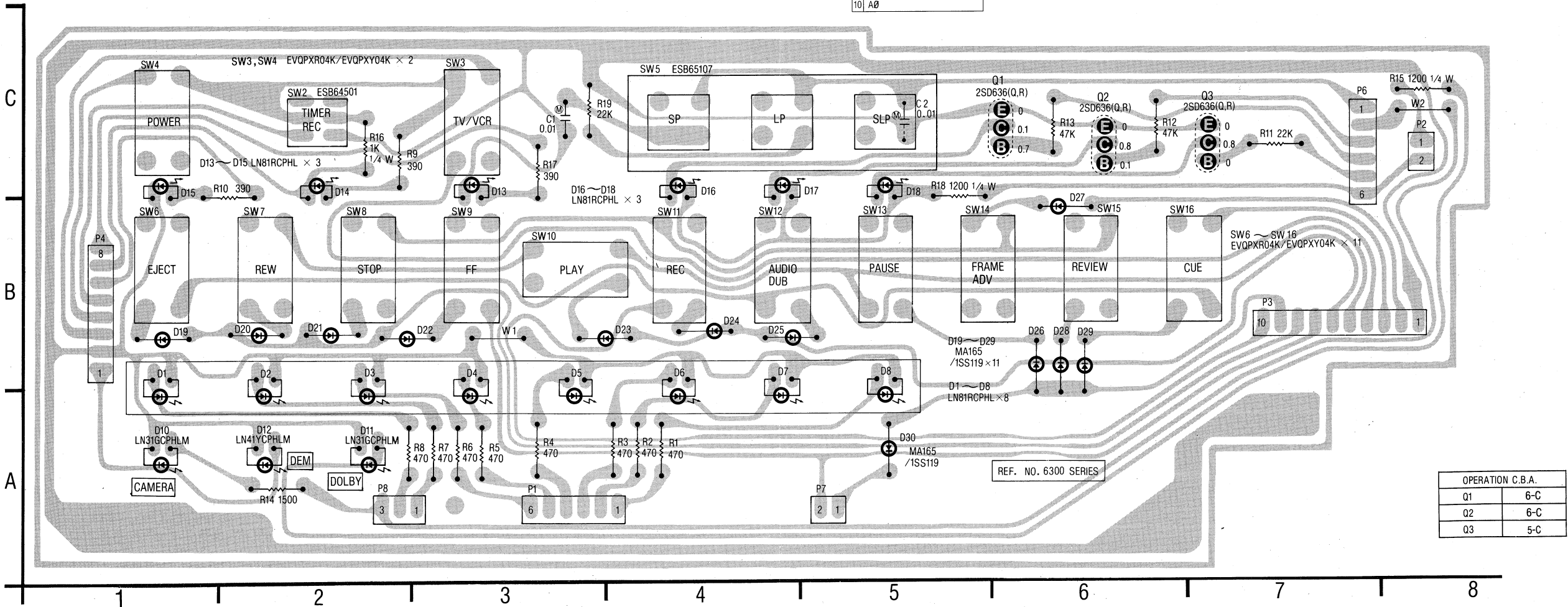
OPERATION C.B.A.



VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL IN SP STOP MODE.

OPERATION C.B.A. VEPS0662A

<div>P1</div> <div>1 PAUSE (H)</div> <div>2 AUDIO DUB (H)</div> <div>3 REC (H)</div> <div>4 PLAY (H)</div> <div>5 FF (H)</div> <div>6 STOP (H)</div>	<div>P2</div> <div>1 DOLBY LED</div> <div>2 REG +12V</div>	<div>P3</div> <div>1 GND</div> <div>2 F2</div> <div>3 A1</div> <div>4 REG +5V IN</div> <div>5 A2</div> <div>6 F0</div> <div>7 A3</div> <div>8 F1</div> <div>9 F3</div> <div>10 A0</div>	<div>P4</div> <div>1 DEW LED</div> <div>2 GND</div> <div>3 TV/VCR SELECT</div> <div>4 POWER SW</div> <div>5 TIMER SET</div> <div>6 POWER LED</div> <div>7 TIMER LED</div> <div>8 TV/VCR LED</div>	<div>P6</div> <div>1 SP/LP/SLP SW</div> <div>2 CAMERA H</div> <div>3 LP H</div> <div>4 SP H</div> <div>5 SLP H</div> <div>6 REG +12V</div>	<div>P7</div> <div>1 MEMORY COUNTER</div> <div>2 MEMORY COUNTER</div>	<div>P8</div> <div>1 REW (H)</div> <div>2 EJECT (H)</div> <div>3 CAMERA (H)</div>
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SYSTEM CONTROL SCHEMATIC DIAGRAM

NOTE : REF. NO. ON C.B.A.
EXAMPLE : C.B.A.
SERIE
6002
TO R

P6013 (SYSTEM CONTROL C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	REEL M CONTROL	P2005-9 SERVO C.B.A.
2	LP/SLP H	P2005-11 SERVO C.B.A.
3	SLP H	P2005-5 SERVO C.B.A.
4	TURN OVER PULSE	P2005-1 SERVO C.B.A.
5	PAUSE H	P2005-10 SERVO C.B.A.
6	STILL H	P2005-8 SERVO C.B.A.
7	FRAME ADV H	P2010-7 SERVO C.B.A.
8	SLOW H	P2010-6 SERVO C.B.A.
9	SLOW SPEED UP L	P2006-1 SERVO C.B.A.
10	SLOW SPEED DOWN L	P2006-2 SERVO C.B.A.

P6018 (SYSTEM CONTROL C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	REG +13V	REMOTE RECEIVING DETECTOR C.B.A.
2	GND	REMOTE RECEIVING DETECTOR C.B.A.
3	IR PULSE	REMOTE RECEIVING DETECTOR C.B.A.

P6002 (SYSTEM CONTROL C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	DEW H	P6304-1 OPERATION C.B.A.
2	AUDIO (II) REEL M CURRENT	P4405-8 OPERATION C.B.A.
3	PLAY H	P6301-4 OPERATION C.B.A.
4	A-DUB H	P6301-2 OPERATION C.B.A.
5	REC H	P6301-3 OPERATION C.B.A.
6	FF H	P6308-5 OPERATION C.B.A.
7	REW H	P6308-1 OPERATION C.B.A.
8	STOP H	P6301-6 OPERATION C.B.A.
9	EJECT H	P6308-2 OPERATION C.B.A.
10	POWER ON H	P6304-6 OPERATION C.B.A.

P6012 (SYSTEM CONTROL C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	TV/VCR SW	P6304-3 OPERATION C.B.A.
2	POWER SW	P6304-4 OPERATION C.B.A.
3	DATA (AI3)	P6303-7 OPERATION C.B.A.
4	DATA (AI2)	P6303-5 OPERATION C.B.A.
5	DATA (AI1)	P6303-3 OPERATION C.B.A.
6	DATA (AI0)	P6303-10 OPERATION C.B.A.

P6005 (SYSTEM CONTROL C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	TIMER SET H	P6304-5 OPERATION C.B.A.
2	TIMER LED	P6304-7 OPERATION C.B.A.
3	GND	P6304-2 OPERATION C.B.A.
4	VCR H	P6304-8 OPERATION C.B.A.
5	REG + 5V	P6303-4 OPERATION C.B.A.
6	CAMERA H	P6308-3 OPERATION C.B.A.

P6006 (SYSTEM CONTROL C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	SUPPLY PHOTO TR	P44 8-2 AUDIO (II) C.B.A.
2	CAMERA PAUSE L	P1554-2 INPUT JACK C.B.A.

(SERVO) P6013
P2005 ⑨ REEL M CONTROL
P2005 ⑪ LP/SLP H
P2005 ⑤ SLP H
P2005 ① TURN OVER PULSE
P2005 ⑩ PAUSE H
P2005 ⑧ STILL H
P2010 ⑦ FRAME ADV H
P2010 ⑥ SLOW H
P2006 ① SLOW SPEED UP L
P2006 ② SLOW SPEED DOWN L

(REMOTE RECEIVING DETECTOR) P6018
REG +13V
GND
IR PULSE

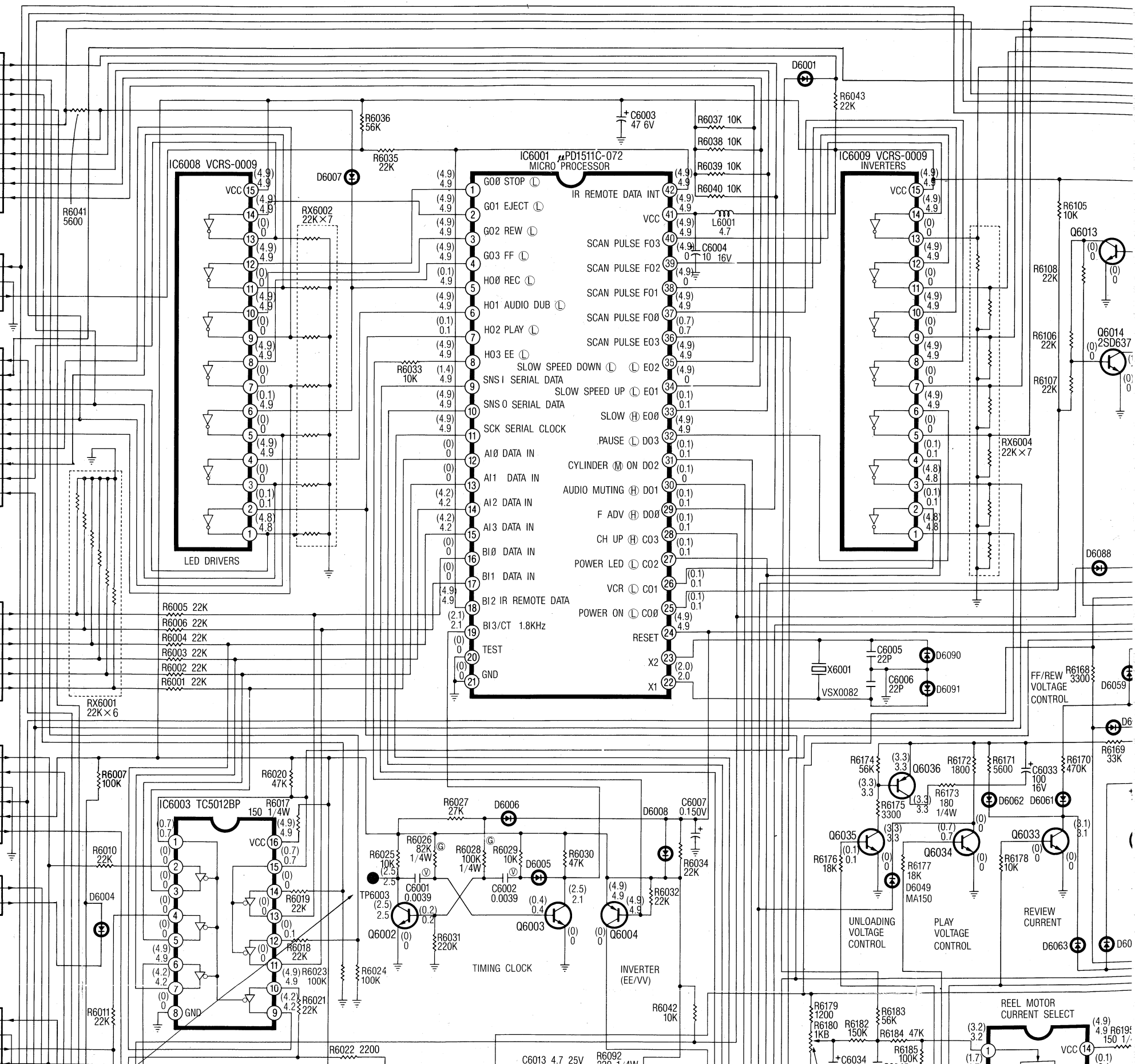
(OPERATION) P6002
(P6304 ①) DEW H
(P4405 ⑧) AUDIO (II) REEL M CURRENT
(P6301 ④) PLAY H
(P6301 ②) A-DUB H
(P6301 ③) REC H
(P6301 ⑤) FF H
(P6308 ①) REW H
(P6301 ⑥) STOP H
(P6308 ②) EJECT H
(P6304 ⑥) POWER ON H

(OPERATION) P6012
(P6304 ③) TV/VCR SW
(P6304 ④) POWER SW
(P6303 ⑦) DATA (AI3)
(P6303 ⑤) DATA (AI2)
(P6303 ③) DATA (AI1)
(P6303 ⑩) DATA (AI0)

(OPERATION) P6005
(P6304 ⑤) TIMER SET H
(P6304 ⑦) TIMER LED
(P6304 ②) GND
(P6304 ⑧) VCR H
(P6303 ④) REG +5V
(P6308 ③) CAMERA H

(P4408 ②) AUDIO (II) SUPPLY PHOTO TR
(P1554 ②) INPUT JACK CAMERA PAUSE L

(P7502 ①) PROGRAMMABLE TIMER CH LOCK H
(P710 ②) TV DEMODULATOR GND
(P7502 ⑤) PROGRAMMABLE TIMER TIMER REC
(P7502 ⑥) PROGRAMMABLE TIMER TIMER



P6006 (SYSTEM CONTROL C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	SUPPLY PHOTO TR	P44 8-2 AUDIO [II] C.B.A.
2	CAMERA PAUSE	P1554-2 INPUT JACK C.B.A.

P6007 (SYSTEM CONTROL C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	CH LOCK	P7502-1 PROGRAMMABLE T.C.B.A.
2	GND	P710-2 TV DEMODULATOR C.B.A.
3	TIMER REC	P7502-5 PROGRAMMABLE T.C.B.A.
4	TIMER SET	P7502-6 PROGRAMMABLE T.C.B.A.
5	TIMER LED	P7502-2 PROGRAMMABLE T.C.B.A.
6	REG +13V	P704-1 TV DEMODULATOR C.B.A.
7	VCR	P710-1 TV DEMODULATOR C.B.A.
8	CASSETTE DOWN	P7502-4 PROGRAMMABLE T.C.B.A.
9	CH UP	P7502-7 PROGRAMMABLE T.C.B.A.
10	POWER LED	P7502-3 PROGRAMMABLE T.C.B.A.

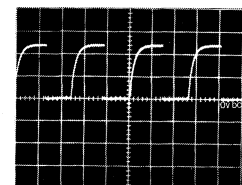
P6008 (SYSTEM CONTROL C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	REG +5V	SAFETY TAB SW C.B.A.
2	SAFETY TAB SW	SAFETY TAB SW C.B.A.
3	CASSETTE DOWN SW	CASSETTE DOWN SW C.B.A.

P6009 (SYSTEM CONTROL C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P1558-2 CONNECTION C.B.A.
2	TAPE SLACK SENSOR	P1558-4 CONNECTION C.B.A.
3	REG +12V	P1558-3 CONNECTION C.B.A.
4	DEW SENSOR	P1558-1 CONNECTION C.B.A.
5	TAKEUP PHOTO TR	P1558-8 CONNECTION C.B.A.

P6010 (SYSTEM CONTROL C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	REEL SENSOR C.B.A.
2	GND	REEL SENSOR C.B.A.
3	REEL SENSOR	REEL SENSOR C.B.A.
4	REG +12V	REEL SENSOR C.B.A.
5	SENSOR LED	REEL SENSOR C.B.A.

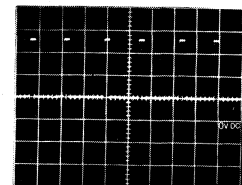
P6011 (SYSTEM CONTROL C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	CUE & REVIEW	MODE SELECT SW C.B.A.
2	POSITION LOCK	MODE SELECT SW C.B.A.
3	EJECT	MODE SELECT SW C.B.A.
4	PLAY	MODE SELECT SW C.B.A.
5	STOP	MODE SELECT SW C.B.A.
6	FF/REW	MODE SELECT SW C.B.A.
7	PAUSE	MODE SELECT SW C.B.A.

(P7502 ① PROGRAMMABLE TIMER) CH LOCK (H)
(P710 ② TV DEMODULATOR) GND
(P7502 ⑤ PROGRAMMABLE TIMER) TIMER REC
(P7502 ⑥ PROGRAMMABLE TIMER) SET (H)
(P7502 ② PROGRAMMABLE TIMER) TIMER LED
(P704 ① TV DEMODULATOR) REG +13V
(P710 ① TV DEMODULATOR) VCR (H)
(P7502 ④ PROGRAMMABLE TIMER) CASSETTE DOWN
(P7502 ⑦ PROGRAMMABLE TIMER) CH UP
(P7502 ③ PROGRAMMABLE TIMER) POWER LED



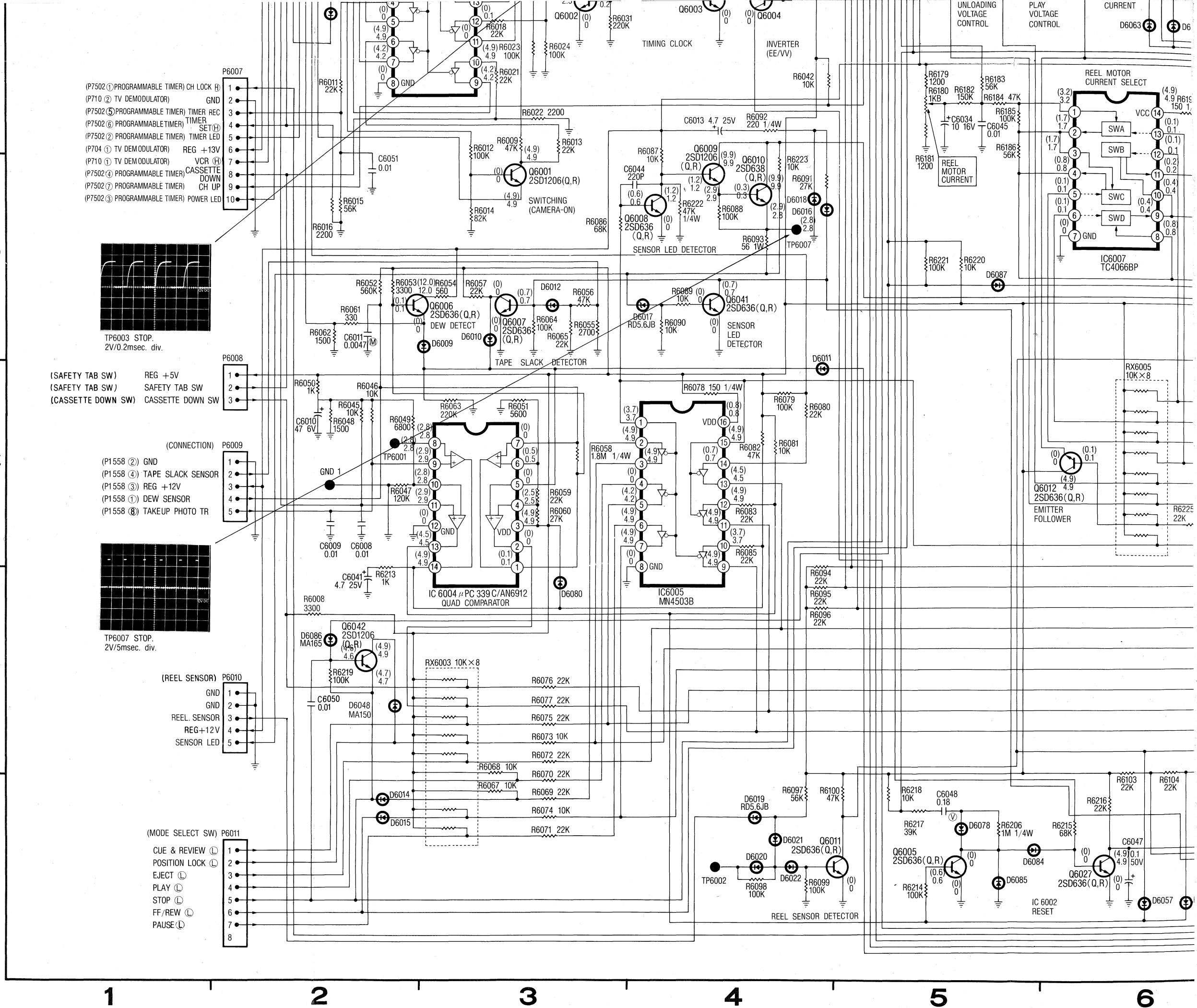
(SAFETY TAB SW) REG +5V
(SAFETY TAB SW) SAFETY TAB SW
(CASSETTE DOWN SW) CASSETTE DOWN SW

(CONNECTION) P6009
(P1558 ②) GND
(P1558 ④) TAPE SLACK SENSOR
(P1558 ③) REG +12V
(P1558 ①) DEW SENSOR
(P1558 ⑧) TAKEUP PHOTO TR

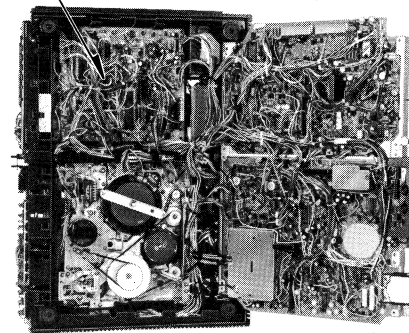


(REEL SENSOR) P6010
GND
GND
REEL SENSOR
REG+12V
SENSOR LED

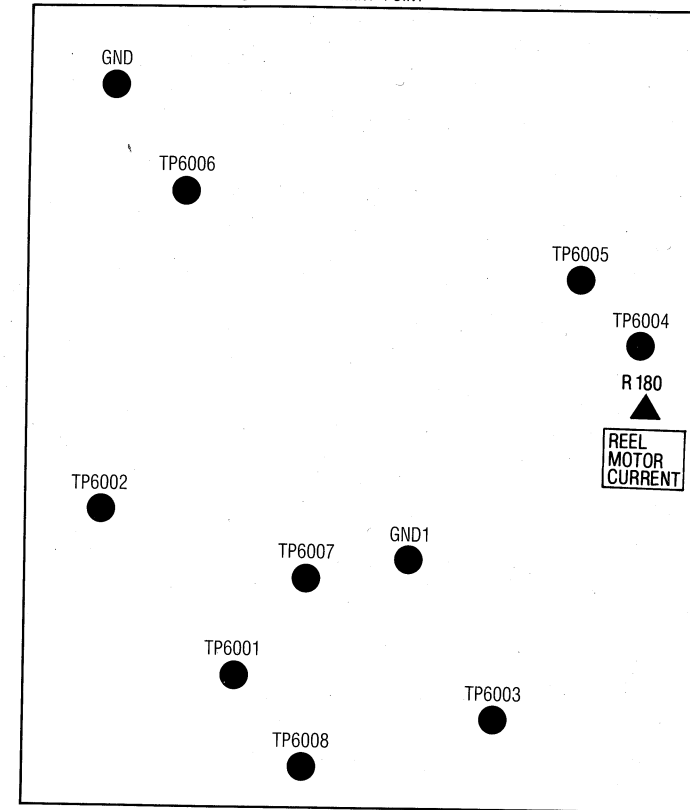
(MODE SELECT SW) P6011
CUE & REVIEW
POSITION LOCK
EJECT
PLAY
STOP
FF/REW
PAUSE



SYSTEM CONTROL C.B.A.



LOCATION OF TEST POINTS & ADJUSTMENT POINT



SYSTEM CONTROL C.B.A. VEPS0650A

VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL IN SP REC MODE.

P6001

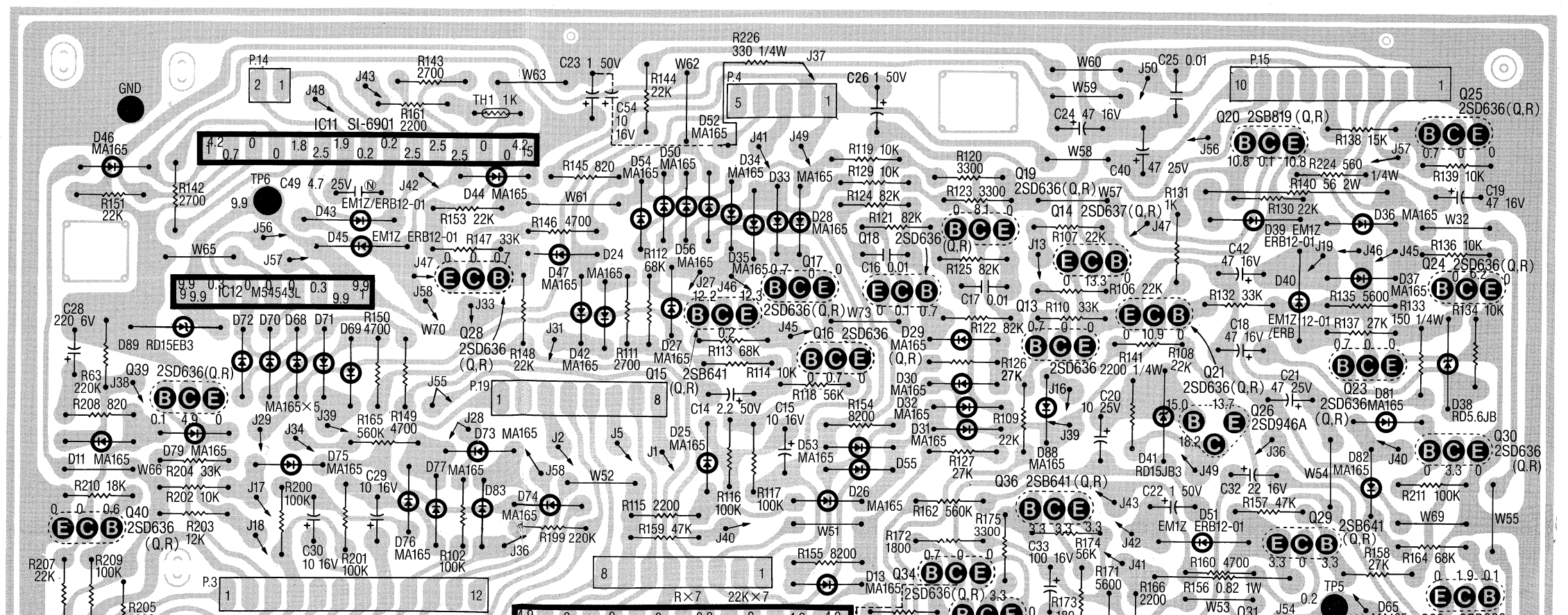
1	PAUSE (H)
2	SCAN PULSE (F0 ϕ)
3	SCAN PULSE (F01)
4	SCAN PULSE (F02)
5	SCAN PULSE (F03)

P6002

1	DEW (H)
2	REEL (M) CURRENT
3	PLAY (H)
4	A-DUB (H)
5	REC (H)
6	FF (H)
7	REW (H)
8	STOP (H)
9	EJECT (H)
10	POWER ON (H)

P6003

1	CAP (M) FG1
2	CYL (M) LOCK (L)
3	CYL (M) ON (H)
4	GND
5	CAP (M) SPEED 2 ⁰
6	CAP (M) SPEED 2 ¹
7	CAP (M) SPEED 2 ²
8	CAP (M) SPEED 2 ³
9	CAP (M) ON (L)
10	CAP (M) REVERSE (H)
11	POWER STOP (H)
12	CLIF/REVIFW (H)



VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL IN SP MODE.

★ : UNMEASURABLE OR UNNECESSARY TO MEASURE.

PIN NO.	IC6001								
	STOP	FF	REW(×9)	REC	PLAY	CUE(×9)	REV	×2	SLOW(1/4)
PIN 1	0.1	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 3	4.9	4.9	0.1	4.9	4.9	4.9	4.9	4.9	4.9
PIN 4	4.9	0.1	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 5	4.9	4.9	4.9	0.1	4.9	4.9	4.9	4.9	4.9
PIN 6	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 7	4.9	4.9	4.9	0.1	0.1	0.1	0.1	0.1	0.1
PIN 8	0	0.1	0.1	4.9	4.9	4.9	4.9	4.9	4.9
PIN 9	4.9	4.9	4.9	1.4	4.9	4.9	4.9	4.9	1.4
PIN 10	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 11	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 12	0	0	0	0	0	0	0	0	0
PIN 13	0	0	0	0	0	0	0	0	0
PIN 14	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
PIN 15	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
PIN 16	0	0	0	0	0	0	0	0	0
PIN 17	0	0	0	0	0	0	0	0	0
PIN 18	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 19	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
PIN 20	0	0	0	0	0	0	0	0	0
PIN 21	0	0	0	0	0	0	0	0	0
PIN 22	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PIN 23	★	★	★	★	★	★	★	★	★
PIN 24	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 25	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PIN 26	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PIN 27	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PIN 28	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PIN 29	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PIN 30	0.1	0.1	0.1	0.1	0	0.1	0.1	0.1	0.1
PIN 31	3.8	3.8	3.8	0.1	0.1	0.1	0.1	0.1	0.1
PIN 32	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 33	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	4.9
PIN 34	4.9	4.9	4.9	4.9	0	4.9	4.9	4.9	4.9
PIN 35	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 36	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
PIN 37	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.8
PIN 38	4.9	4.9	4.9	4.9	0	4.9	4.9	4.9	4.9
PIN 39	4.9	4.9	4.9	4.9	0	4.9	4.9	4.9	4.9
PIN 40	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 41	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 42	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9

PIN NO.	IC6002								
	STOP	FF	REW(×9)	REC	PLAY	CUE(×9)	REV	×2	SLOW(1/4)
PIN 1	0.1	0.1	0.1	0.1	0.1	0.1	0	0.1	0.1
PIN 2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PIN 3	0.1	0.1	0.1	0.1	0.1	0.1	4.9	0.1	0.1
PIN 4	4.9	4.9	4.9	0.1	0.1	4.9	4.9	0.1	0.1
PIN 5	0.1	0.1	0.1	3.6	3.6	0.1	0.1	3.6	3.6
PIN 6	3.6	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PIN 7	0.1	4.9	4.9	0.1	0.1	0.1	0.1	0.1	0.1
PIN 8	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
PIN 9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 10	4.9	4.9	4.9	1.4	4.9	4.9	4.9	4.9	1.4
PIN 11	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 12	4.9	4.9	4.9	4.9	4.9	4.9	4.2	4.9	4.9
PIN 13	4.2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 14	4.9	-0.2	1.2	4.9	4.9	4.9	4.9	4.9	4.9
PIN 15	4.9	4.9	4.9	4.2	4.2	4.2	0.7	4.2	4.2
PIN 16	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
PIN 17	0.8	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8
PIN 18	0	2.2	2.2	★	★	2.2	2.2	★	★
PIN 19	0	0	0	0	0	2.3	2.3	0	★
PIN 20	0	0	0	0	0	0	0	0	0
PIN 21	0	0	0	0	0	0	0	0	0
PIN 22	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PIN 23	★	★	★	★	★	★	★	★	★
PIN 24	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 25	4.3	4.3	4.3	4.3	4.3	4.3	4.3	0.1	0.1
PIN 26	0.1	0.1	0.1	0.1	0.1	0.1	0.1	4.2	0.1
PIN 27	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PIN 28	0.1	0.1	0.1	0.1	0.1	4.9	4.9	0.1	0.1
PIN 29	4.2	4.2	4.2	0.1	0.1	0.1	0.1	0.1	0.1
PIN 30	0.1	0.1	0.1	0.1	0.1	0.1	4.4	0.1	0.1
PIN 31	0.1	0.1	0.1	0.1	0.1	3.0	3.0	3.0	3.0
PIN 32	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PIN 33	4.9	4.9	4.9	0.1	4.9	4.9	4.9	4.9	4.9
PIN 34	4.9	4.9	4.9	4.9	4.9	0.1	0.1	4.9	4.9
PIN 35	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 36	0	0	0	0	0	0	0	0	0
PIN 37	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 38	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 39	4.9	4.9	0.1	4.9	4.9	4.9	0.1	4.9	4.9
PIN 40	4.9	0.1	4.9	0.1	0.1	0.1	4.9	0.1	0.1
PIN 41	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 42	0	2.2	2.2	★	★	2.2	2.2	★	★

PIN NO.	IC6003								
	STOP	FF	REW(×9)	REC	PLAY	CUE(×9)	REV	×2	SLOW(1/4)
PIN 1	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
PIN 2	0	0	0	0	0	0	0	0	0
PIN 3	0	0	0	0	0	0	0	0	0
PIN 4	0	0	0	0	0	0	0	0	0
PIN 5	0	0	0	0	0	0	0	0	0
PIN 6	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 7	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
PIN 8	0	0	0	0	0	0	0	0	0
PIN 9	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
PIN 10	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 11	0	0	0	0	0	0	0	0	0
PIN 12	0.1	0.1	0.1	0	0.1	0.1	0.1	0.1	0.1
PIN 13	0	0	0	0	0	0	0	0	0
PIN 14	0	0	0	0	0	0	0	0	0
PIN 15	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
PIN 16	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9

PIN NO.	IC6004								
	STOP	FF	REW(×9)	REC	PLAY	CUE(×9)	REV	×2	SLOW(1/4)
PIN 1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PIN 2	0	0	0	0	0	0	0	0	0
PIN 3	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
PIN 5	0.3	0.3	0.3	0	0	0	0	0	0
PIN 6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
PIN 7	0	0	0	0	0	0	0	0	0
PIN 8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
PIN 9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
PIN 10	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
PIN 11	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
PIN 12	0	0	0	0	0	0	0	0	0
PIN 13	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
PIN 14	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9

SYSTEM CONTROL C.B.A.	
Q1	4-C
Q2	4-A
Q3	4-A
Q4	6-B
Q5	3-A
Q6	2-B
Q7	2-B
Q8	3-B
Q9	3-B
Q10	3-B
Q11	2-C
Q12	4-D
Q13	5-E
Q14	5-E
Q15	4-E
Q16	4-E
Q17	4-E
Q18	4-E
Q19	5-F
Q20	5-F
Q21	5-E
Q22	3-A

PIN NO.	IC6005								
	STOP	FF	REW(×9)	REC	PLAY	CUE(×9)	REV	×2	SLOW(1/4)
PIN 1	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
PIN 2	0.6	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 3	4.2	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 4	4.9	4.9	4.9	0	0	0	4.9	0	0
PIN 5	4.9	4.9	4.9	4.2	4.2	4.2	0.7	4.2	4.2
PIN 6	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 7	4.9	1.2	1.2	4.9	4.9	4.9	4.9	4.9	4.9
PIN 8	0	0	0	0	0	0	0	0	0
PIN 9	0.8	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8
PIN 10	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 11	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
PIN 12	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
PIN 13	4.9	4.9	4.9	4.9	4.9	4.9	4.2	4.9	4.9
PIN 14	4.9	4.9	4.9	4.9	4.9	4.9	0.1	4.9	4.9
PIN 15	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
PIN 16	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9

PIN NO.	IC6006								
	STOP	FF	REW(×9)	REC	PLAY	CUE(×9)	REV	×2	SLOW(1/4)
PIN 1	0	8.8	8.7	4.0	4.0	6.1	7.2	4.2	3.1
PIN 2	3.6	8.1	8.0	3.3	3.3	5.3	6.3	3.5	2.4
PIN 3	3.6	8.1	8.0	3.3	3.3	5.3	6.3	3.5	2.4
PIN 4	0	0	0	0	0	0	0	0	0
PIN 5	0.2	1.6	1.6	0.2	0.2	0.2	0.3	0.2	0.1
PIN 6	0	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.1
PIN 7	12.4	12.4	12.5	2.7	2.7	4.6	4.3	2.9	1.8
PIN 8	13.6	13.6	13.7	13.6	13.6	13.7	13.7	13.7	13.7

4	GND
5	CAP (M) SPEED 2 ⁰
6	CAP (M) SPEED 2 ¹
7	CAP (M) SPEED 2 ²
8	CAP (M) SPEED 2 ³
9	CAP (M) ON (L)
10	CAP (M) REVERSE (H)
11	POWER STOP (H)
12	CUE/REVIEW (H)

P6004

1	UNREG +19V
2	POWER TR Q1556 (E)
3	POWER TR Q1555 (E)
4	POWER TR Q1555 (B)
5	POWER TR Q1556 (B)

P6005

1	TIMER SET (H)
2	TIMER LED
3	GND
4	VCR (H)
5	REG +5V
6	CAMERA (H)

P6006

1	SUPPLY PHOTO TR
2	CAMERA PAUSE (L)

P6007

1	CH LOCK (H)
2	GND
3	TIMER REC
4	TIMER SET (H)
5	TIMER LED
6	REG +13V
7	VCR (H)
8	CASSETTE DOWN
9	CH UP
10	POWER LED

P6008

1	REG +5V
2	SAFETY TAB SW
3	CASSETTE DOWN SW

P6009

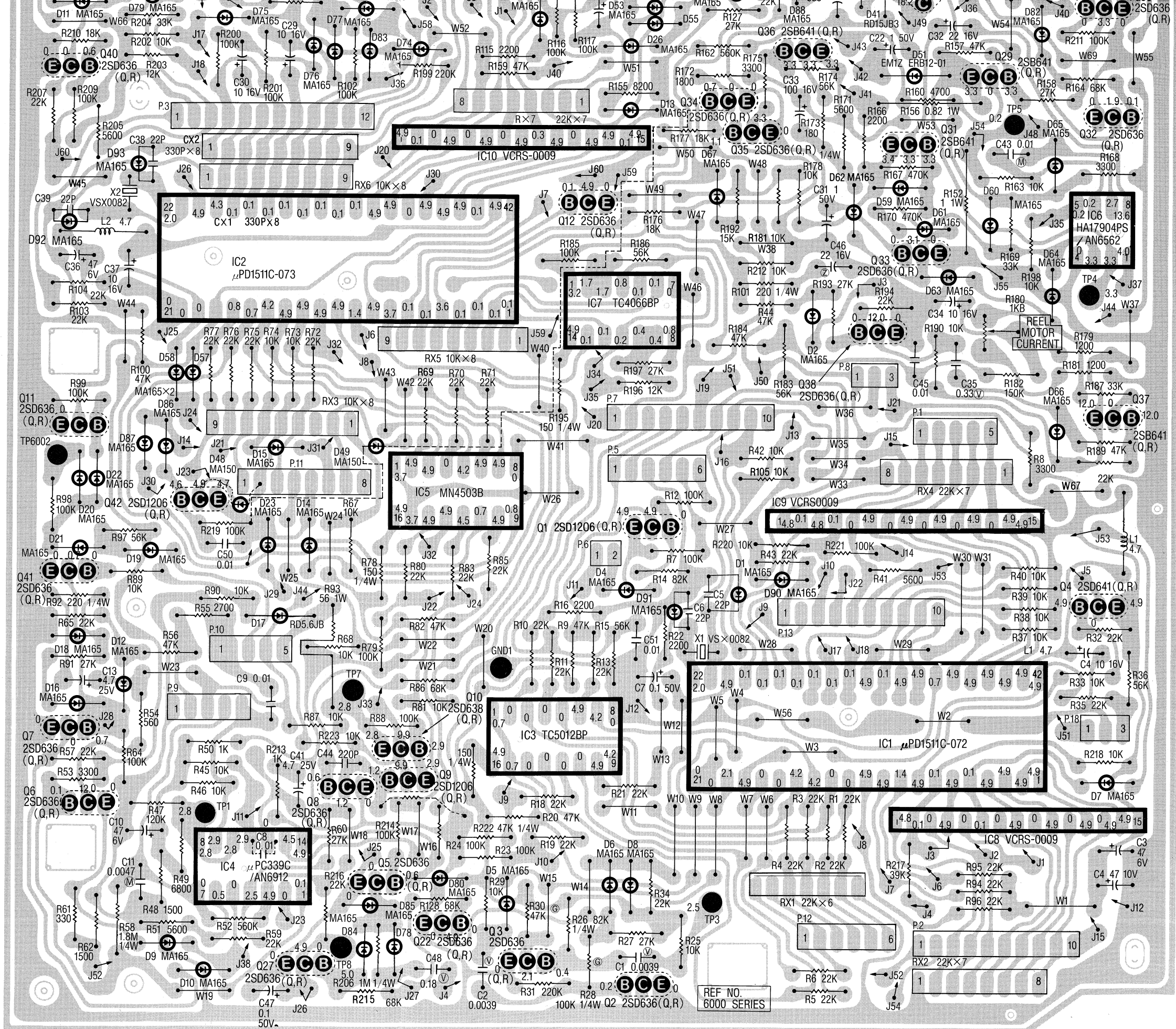
1	GND
2	TAKE SLACK SENSOR
3	REG +12V
4	DEW SENSOR
5	TAKEUP PHOTO TR

P6010

1	GND
2	GND
3	REEL SENSOR
4	REG +12V
5	SENSOR LED

P6011

1	CUE & REVIEW (L)
2	POSITION LOCK (L)
3	EJECT (L)
4	PLAY (L)
5	STOP (L)
6	FF/REW (L)
7	PAUSE (L)
8	



P601

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P601

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P601

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P601

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P601

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P601

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P601

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P601

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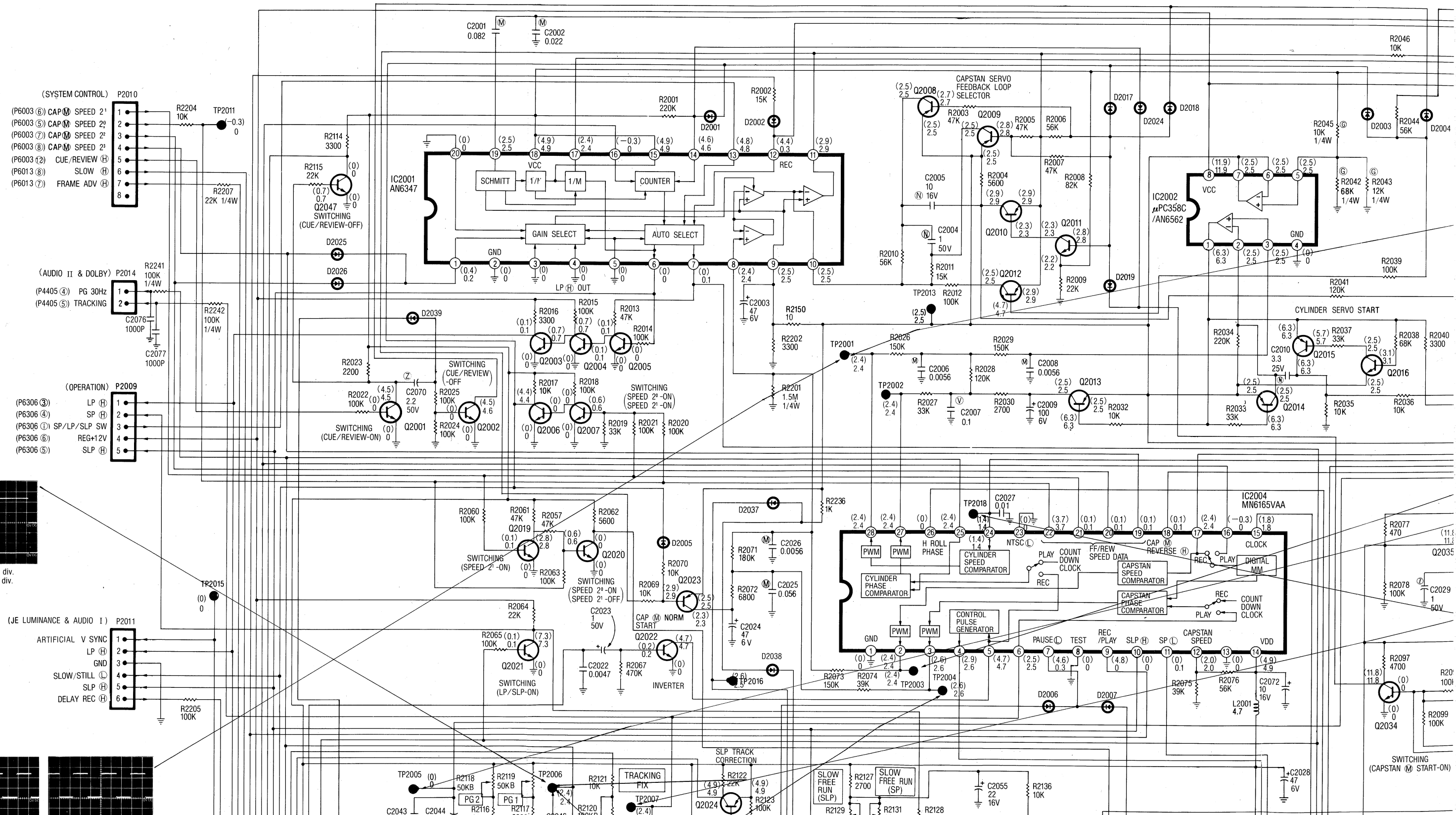
P601


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SERVO SCHEMATIC DIAGRAM

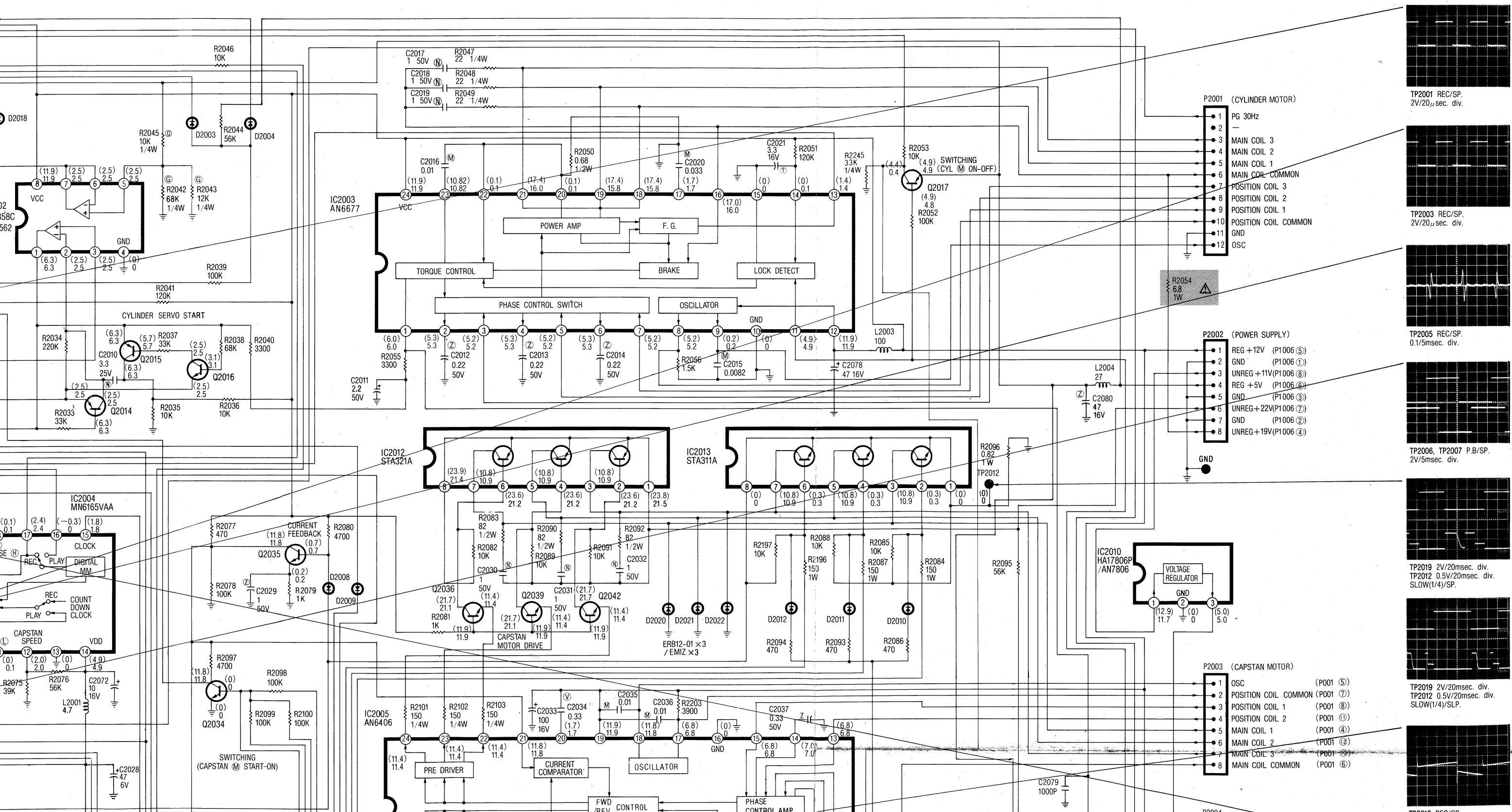
NOTE : REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
EXAMPLE : C.B.A.R2, REF. NO. 2000
SERIES SCHEMATIC DIAGRAM.....
2002 (2002 IS ABBREVIATED
TO R2)

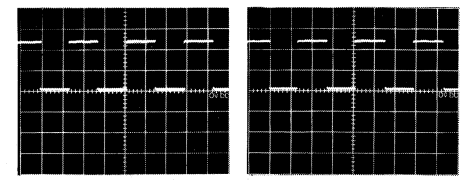
IMPORTANT SAFETY
COMPONENTS IDENTIFIED
SPECIAL CHARACTERISTICS
WHEN REPLACING
ONLY THE SPECIFIED



IMPORTANT SAFETY NOTICE :
COMPONENTS IDENTIFIED BY THE SIGN  HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

VOLTAGE MEASUREMENT :
COLOR BAR SIGNAL IN SP REC MODE WITH IN BRACKET.
COLOR BAR SIGNAL IN SP PLAY MODE WITH OUT BRACKET.





TP2002 REC/SP.
2V/0.1msec. div.

TP2002 REV/SP.
2V/0.1msec. div.

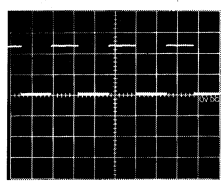
(JD LUMINANCE & AUDIO (1)) P2012

- CUE/REVIEW (H) 1
- LP/SLP (H) 2
- STILL (H) 3
- REG +5V 4
- LP/SLP (H) 5
- V CORRECTION 6
- PG 30Hz 7
- REC +5V 8

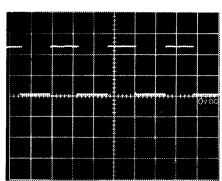
(AUDIO/CONTROL HEAD) P2013

- CONTROL HEAD (GND) 1
- CONTROL HEAD 2

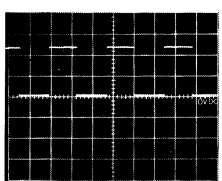
CHROMINANCE



TP2004 REC/SP.
2V/0.1msec. div.

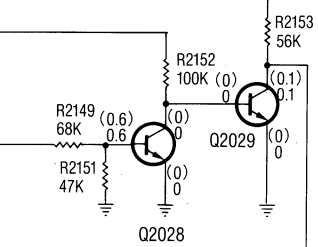


TP2004 REV/SP.
2V/0.1msec. div.

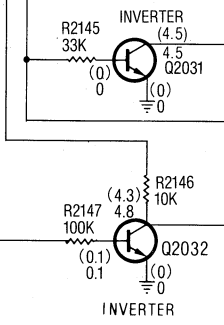


TP2004 X2/SP.
2V/0.1msec. div.

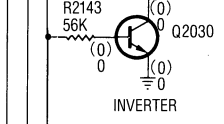
UNLESS OTHERWISE SPECIFIED:
NPN TRANSISTORS ARE 2SD636 (Q.R.S.),
PNP TRANSISTORS ARE 2SB641 (Q.R.S.) AND
DIODES ARE 1A165/1SS119.



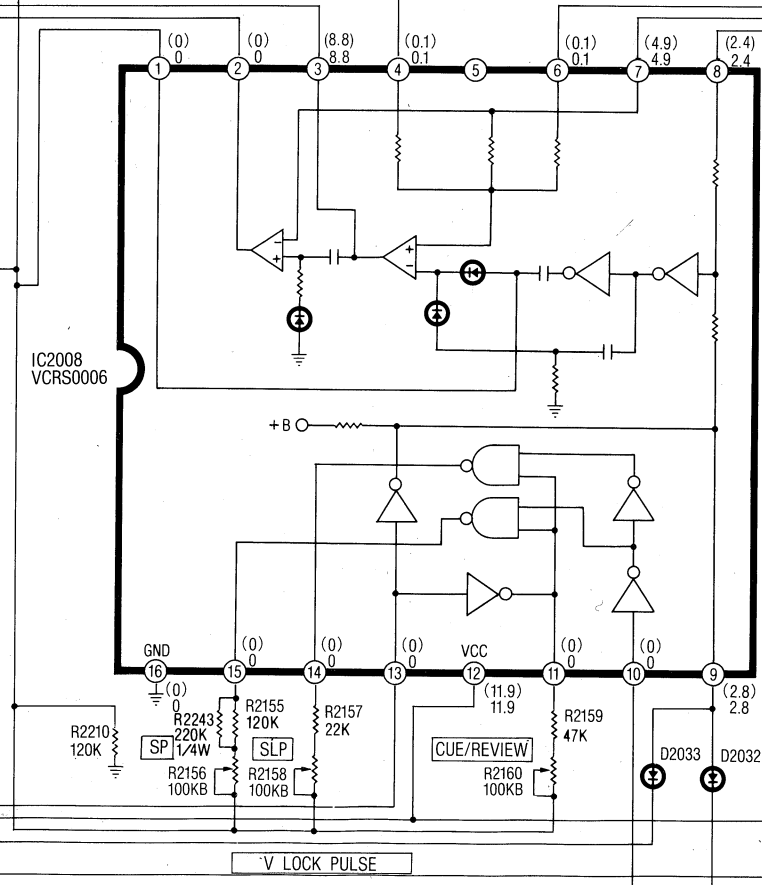
Q2028
SWITCHING (LP-SLOW/STILL OUT)



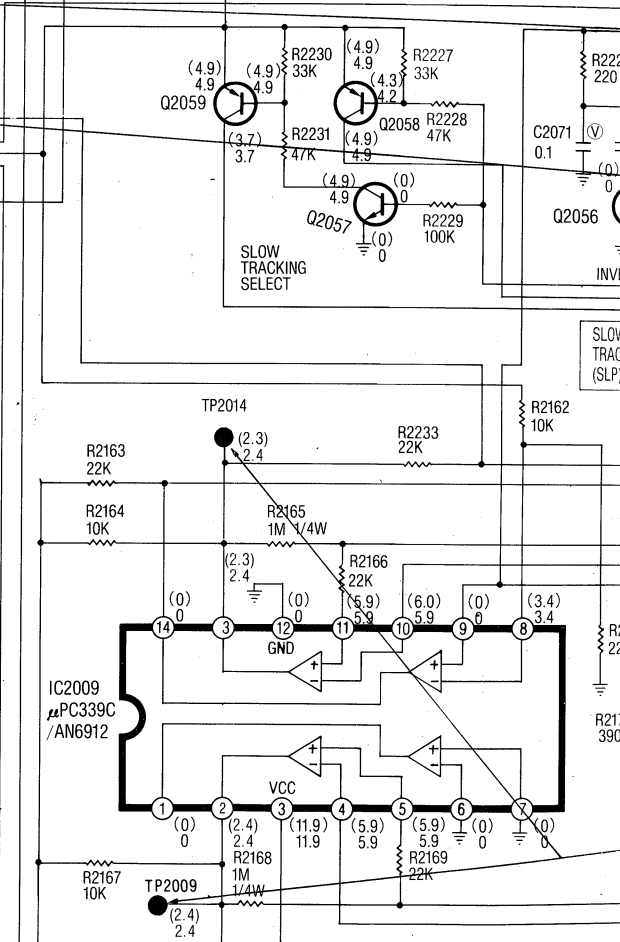
Q2032
INVERTER



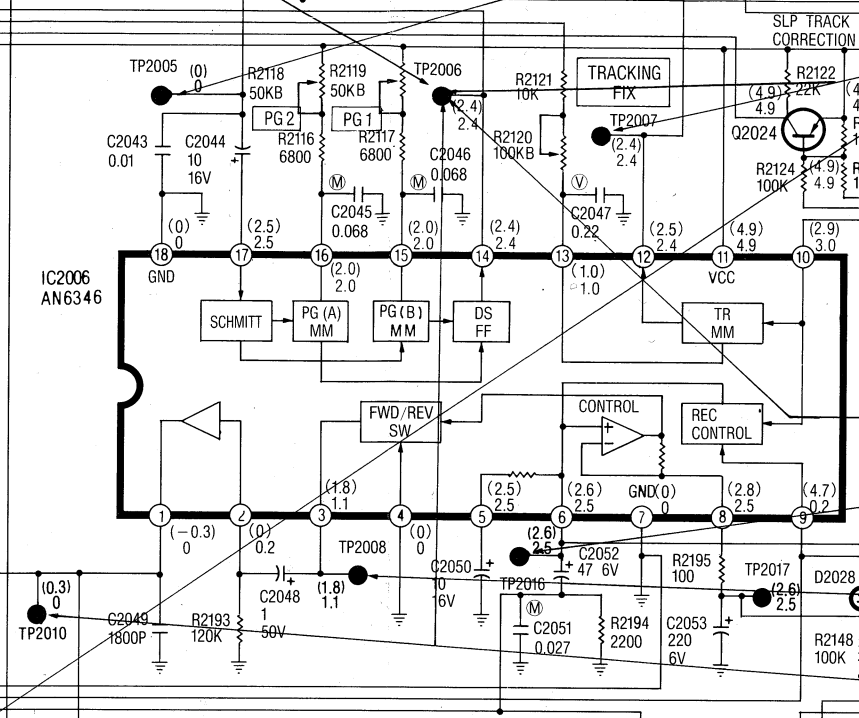
Q2030
INVERTER



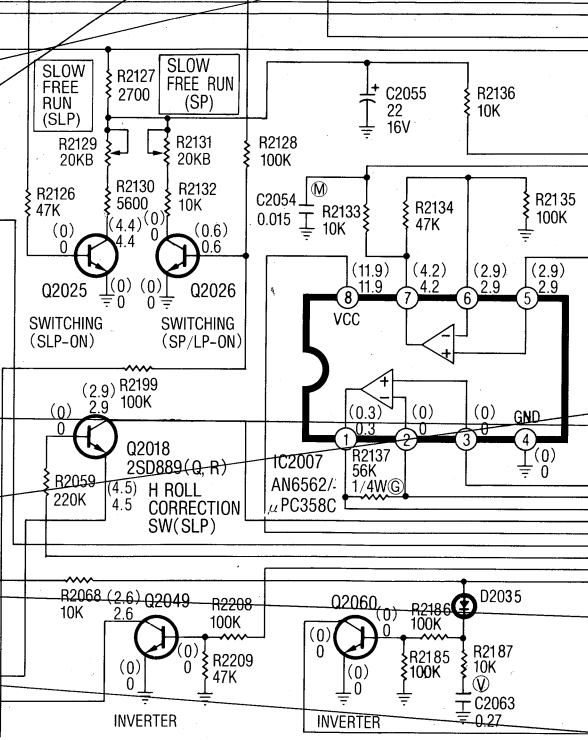
IC2008
VCRS0006



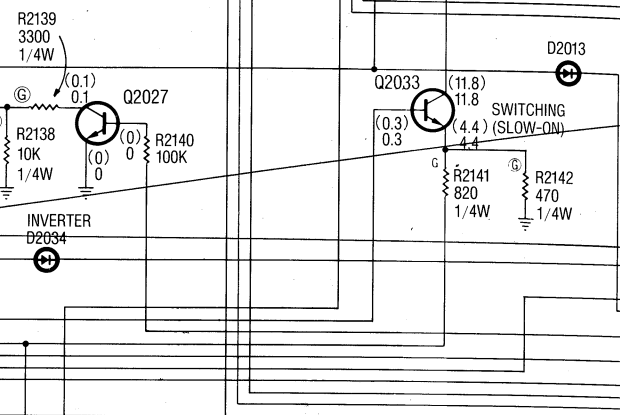
IC2009
PC339C/AN6912



IC2006
AN6346



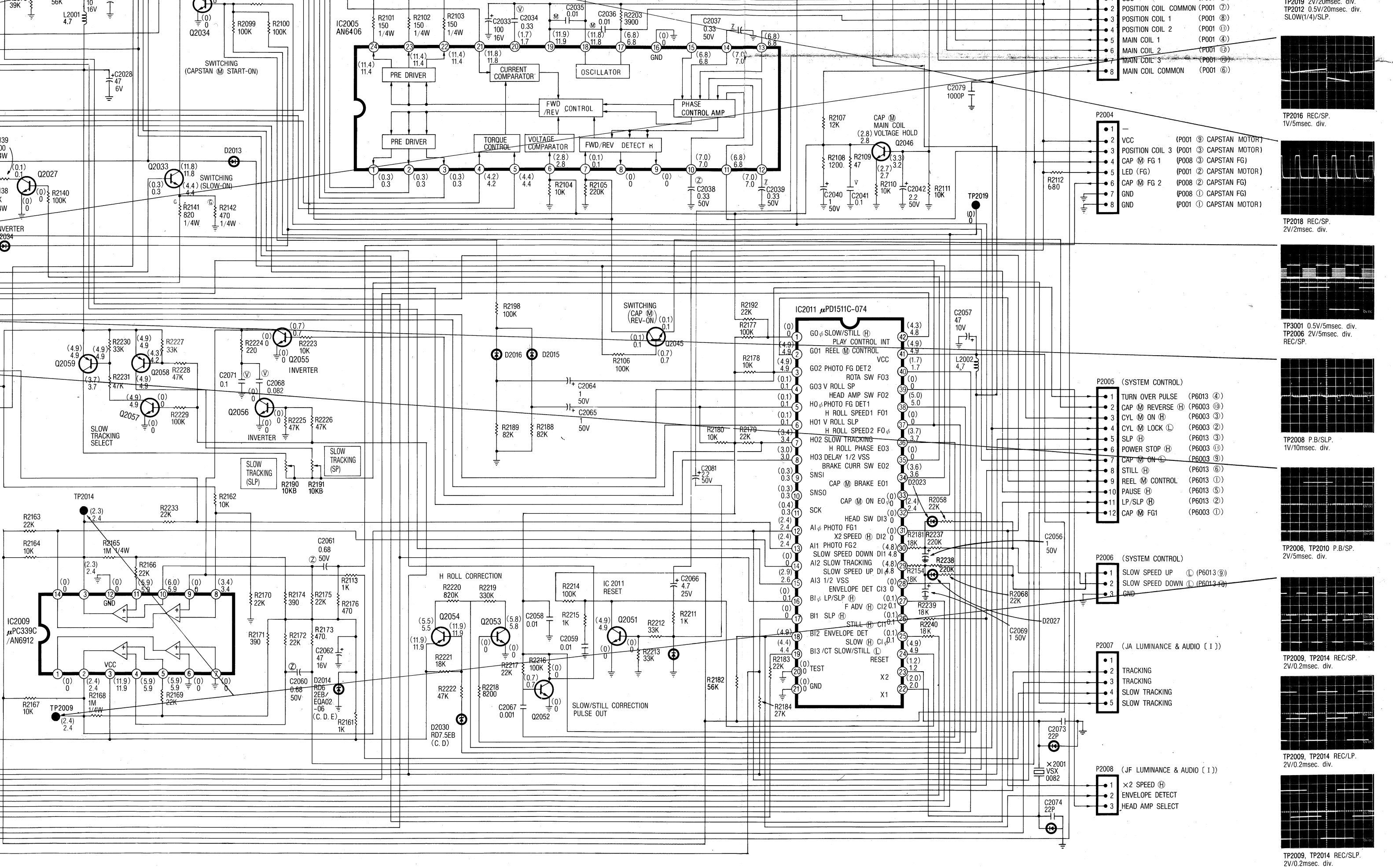
IC2007
AN6562/PC358C



IC2013

IC2013

IC2013



P2001 (SERVO, SLOW, STILL & CHROMINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	PG 30 Hz	CYLINDER MOTER
2		CYLINDER MOTER
3	MAIN COIL 3	CYLINDER MOTER
4	MAIN COIL 2	CYLINDER MOTER
5	MAIN COIL 1	CYLINDER MOTER
6	MAIN COIL COMMON	CYLINDER MOTER
7	POSITION COIL 3	CYLINDER MOTER
8	POSITION COIL 2	CYLINDER MOTER
9	POSITION COIL 1	CYLINDER MOTER
10	POSITION COIL COMMON	CYLINDER MOTER
11	GND	CYLINDER MOTER
12	OSC	CYLINDER MOTER

P2002 (SERVO, SLOW, STILL & CHROMINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	REG +12V	P1006-5 POWER SUPPLY C.B.A.
2	GND	P1006-1 POWER SUPPLY C.B.A.
3	UNREG +11V	P1006-8 POWER SUPPLY C.B.A.
4	REG +5V	P1006-6 POWER SUPPLY C.B.A.
5	GND	P1006-3 POWER SUPPLY C.B.A.
6	UNREG +22V	P1006-7 POWER SUPPLY C.B.A.
7	GND	P1006-2 POWER SUPPLY C.B.A.
8	UNREG +19V	P1006-4 POWER SUPPLY C.B.A.

P2003 (SERVO, SLOW, STILL & CHROMINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	OSC	P001-5 CAPSTAN MOTER
2	POSITION COIL COMMON	P001-7 CAPSTAN MOTER
3	POSITION COIL 1	P001-8 CAPSTAN MOTER
4	POSITION COIL 2	P001-11 CAPSTAN MOTER
5	MAIN COIL 1	P001-4 CAPSTAN MOTER
6	MAIN COIL 2	P001-12 CAPSTAN MOTER
7	MAIN COIL 3	P001-10 CAPSTAN MOTER
8	MAIN COIL COMMON	P001-6 CAPSTAN MOTER

P2004 (SERVO, SLOW, STILL & CHORINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1		
2	VCC	P001-9 CAPSTAN MOTER
3	POSITION COIL 3	P001-3 CAPSTAN MOTER
4	CAP Ⓜ FG1	P008-3 CAPSTAN FG
5	LED (FG)	P001-2 CAPSTAN MOTER
6	CAP Ⓜ FG2	P008-2 CAPSTAN FG
7	GND	P008-1 CAPSTAN FG
8	GND	P001-1 CAPSTAN MOTER

P2005 (SERVO, SLOW, STILL & CHROMINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	6 DESTINATION
1	TURN OVER PULSE	P6013-4 SYSTEM CONTROL C.B.A.
2	CAP Ⓜ REVERSE Ⓜ	P6003-10 SYSTEM CONTROL C.B.A.
3	CYL Ⓜ ON Ⓜ	P6003-3 SYSTEM CONTROL C.B.A.
4	CYL Ⓜ LOCK Ⓜ	P6003-2 SYSTEM CONTROL C.B.A.
5	SLP Ⓜ	P6013-3 SYSTEM CONTROL C.B.A.
6	POWER STOP Ⓜ	P6003-11 SYSTEM CONTROL C.B.A.
7	CAP Ⓜ ON Ⓜ	P6003-9 SYSTEM CONTROL C.B.A.
8	STILL Ⓜ	P6013-6 SYSTEM CONTROL C.B.A.
9	REEL Ⓜ CONTROL	P6013-1 SYSTEM CONTROL C.B.A.
10	PAUSE Ⓜ	P6013-5 SYSTEM CONTROL C.B.A.
11	LP/SLP Ⓜ	P6013-2 SYSTEM CONTROL C.B.A.
12	CAP Ⓜ FG1	P6003-1 SYSTEM CONTROL C.B.A.

P2006 (SERVO, SLOW, STILL & CHROMINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	SLOW SPEED UP Ⓜ	P6013-9 SYSTEM CONTROL C.B.A.
2	SLOW SPEED DOWN Ⓜ	P6013-10 SYSTEM CONTROL C.B.A.
3	GND	

P2007 (SERVO, SLOW, STILL & CHROMINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1		
2	TRACKING	JA-1 LUMINANCE & AUDIO [I] C.B.A.
3	TRACKING	JA-2 LUMINANCE & AUDIO [I] C.B.A.
4	SLOW TRACKING	JA-3 LUMINANCE & AUDIO [I] C.B.A.
5	SLOW TRACKING	JA-4 LUMINANCE & AUDIO [I] C.B.A.

P2008 (SERVO, SLOW, STILL & CHROMINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	×2 SPEED Ⓜ	JF-3 LUMINANCE & AUDIO [I] C.B.A.
2	ENVELOPE DEFECT	JF-2 LUMINANCE & AUDIO [I] C.B.A.
3	HEAD AMP SELECT	JF-3 LUMINANCE & AUDIO [I] C.B.A.

P2009 (SERVO, SLOW, STILL & CHROMINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	LP Ⓜ	P6306-3 OPERATION C.B.A.
2	SP Ⓜ	P6306-4 OPERATION C.B.A.
3	SP/LP/SLP SW	P6306-1 OPERATION C.B.A.
4	REG +12V	P6306-6 OPERATION C.B.A.
5	SLP Ⓜ	P6306-5 OPERATION C.B.A.

P2010 (SERVO, SLOW, STILL & CHROMINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	CAP M SPEED 2^1	P6003-6 SYSTEM CONTROL C.B.A.
2	CAP M SPEED 2^0	P6003-5 SYSTEM CONTROL C.B.A.
3	CAP M SPEED 2^2	P6003-7 SYSTEM CONTROL C.B.A.
4	CAP M SPEED 2^3	P6003-8 SYSTEM CONTROL C.B.A.
5	CUE/REVIEW H	P6003-12 SYSTEM CONTROL C.B.A.
6	SLOW H	P6013-8 SYSTEM CONTROL C.B.A.
7	FRAM ADV H	P6013-7 SYSTEM CONTROL C.B.A.
8		

P2011 (SERVO, SLOW, STILL & CHROMINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	ARTIFICIAL VSYNC	JE-1 LUMINANCE & AUDIO [I] C.B.A.
2	LP H	JE-2 LUMINANCE & AUDIO [I] C.B.A.
3	GND	JE-3 LUMINANCE & AUDIO [I] C.B.A.
4	SLOW/STILL L	JE-4 LUMINANCE & AUDIO [I] C.B.A.
5	SLP H	JE-5 LUMINANCE & AUDIO [I] C.B.A.
6	DELAY REC H	JE-6 LUMINANCE & AUDIO [I] C.B.A.

P2012 (SERVO, SLOW, STILL & CHROMINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	CUE/REVIEW H	JD-1 LUMINANCE & AUDIO [I] C.B.A.
2	LP/SLP H	JD-2 LUMINANCE & AUDIO [I] C.B.A.
3	STILL H	JD-3 LUMINANCE & AUDIO [I] C.B.A.
4	REG +5V	JD-4 LUMINANCE & AUDIO [I] C.B.A.
5	LP/SLP H	JD-5 LUMINANCE & AUDIO [I] C.B.A.
6	V CORRECTION	JD-6 LUMINANCE & AUDIO [I] C.B.A.
7	PG 30Hz	JD-7 LUMINANCE & AUDIO [I] C.B.A.
8	REC +5V	JD-8 LUMINANCE & AUDIO [I] C.B.A.

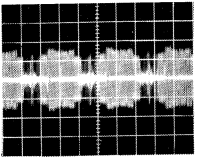
P2013 (SERVO, SLOW, STILL & CHROMINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	CONTROL HEAD (GND)	AUDIO/CONTROL LIEAD C.B.A.
2	CONTROL HEAD	AUDIO/CONTROL LIEAD C.B.A.

P2014 (SERVO, SLOW, STILL & CHROMINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	PG 30Hz	P4405-4 AUDIO [II] & DOLBY C.B.A.
2	TRACKING	P4405-5 AUDIO [II] & DOLBY C.B.A.

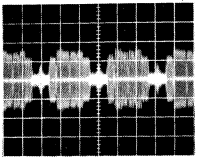
CHROMINANCE SCHEMATIC DIAGRAM

NOTE : REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS. VOLTAGE MEASUREMENT
EXAMPLE : C.B.A.....R2, REF. NO. 1000
SERIES SCHEMATIC DIAGRAM.....
1002 (1002 IS ABBREVIATED
TO R2)

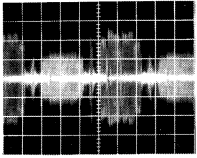
COLOR BAR SIGNAL
BRACKET.
COLOR BAR SIGNAL
BRACKET.



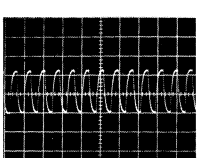
IC8001 (8) P.B/S.P.
0.1V/20µsec. div.



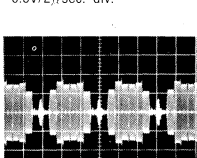
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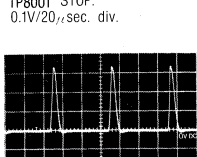
IC8001 (8) P.B/SLP.
0.1V/20µsec. div.



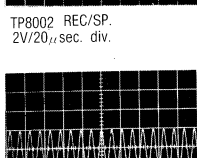
TP8009 REC/SP.
0.5V/2µsec. div.



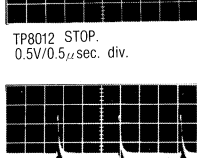
TP8001 STOP.
0.1V/20µsec. div.



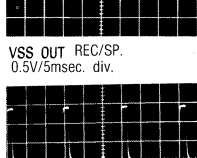
TP8002 REC/SP.
2V/20µsec. div.



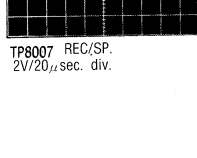
IC8003 (8) REC/SP.
0.5V/20µsec. div.



TP8012 STOP.
0.5V/0.5µsec. div.



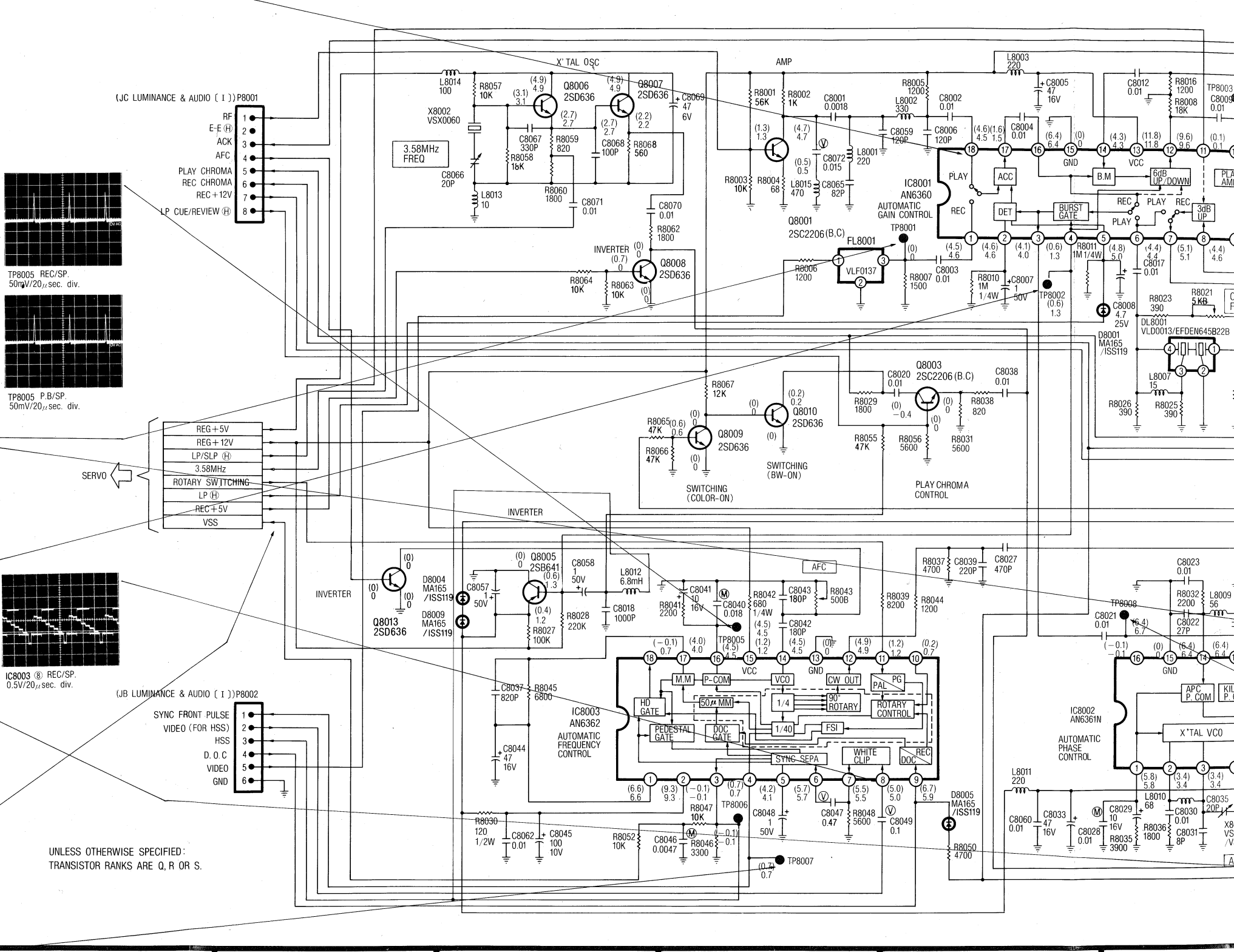
VSS OUT REC/SP.
0.5V/5msec. div.



TP8007 REC/SP.
2V/20µsec. div.

P8001 (CHROMINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	RF	JC LUMINANCE & AUDIO [1] C.B.A.
2	E-E (H)	JC LUMINANCE & AUDIO [1] C.B.A.
3	ACK	JC LUMINANCE & AUDIO [1] C.B.A.
4	AFC	JC LUMINANCE & AUDIO [1] C.B.A.
5	PLAY CHROMA	JC LUMINANCE & AUDIO [1] C.B.A.
6	REC CHROMA	JC LUMINANCE & AUDIO [1] C.B.A.
7	REC +12V	JC LUMINANCE & AUDIO [1] C.B.A.
8	LP CUE/REVIEW (H)	JC LUMINANCE & AUDIO [1] C.B.A.

P8002 (CHROMINANCE C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	SYNC FRONT PULSE	JB LUMINANCE & AUDIO [1] C.B.A.
2	VIDEO (FOR HSS)	JB LUMINANCE & AUDIO [1] C.B.A.
3	HSS	JB LUMINANCE & AUDIO [1] C.B.A.
4	D.O.C.	JB LUMINANCE & AUDIO [1] C.B.A.
5	VIDEO	JB LUMINANCE & AUDIO [1] C.B.A.
6	GND	JB LUMINANCE & AUDIO [1] C.B.A.

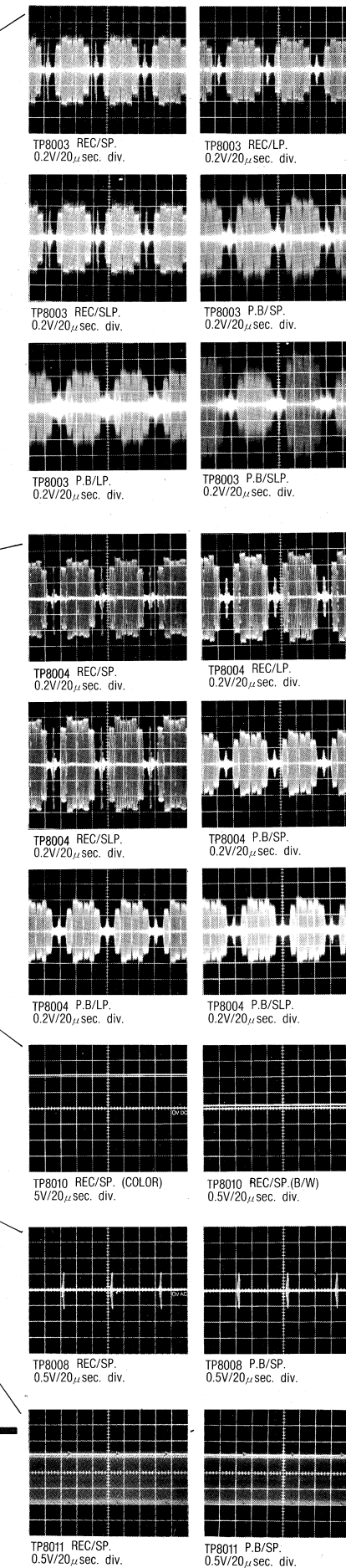
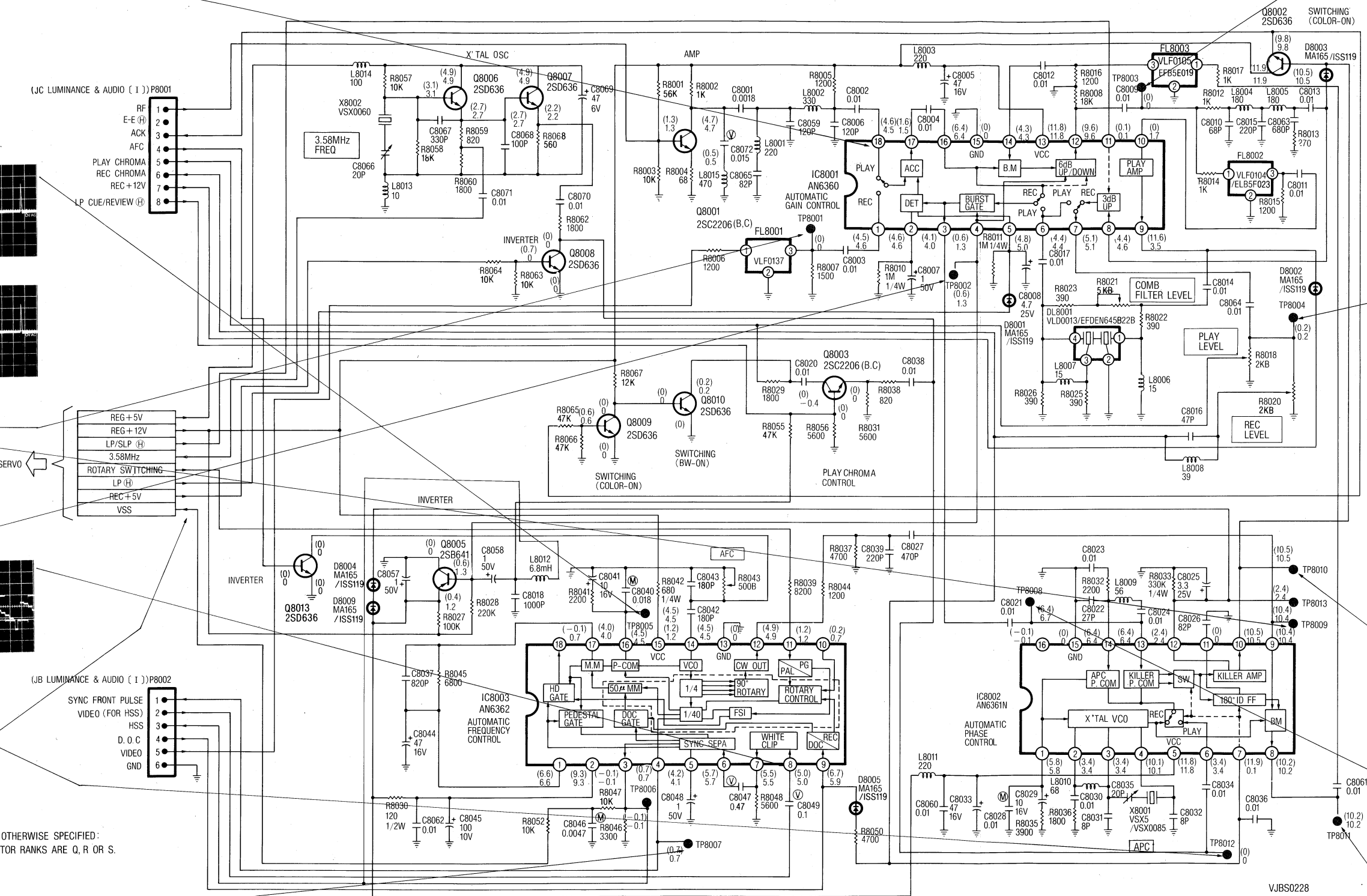


UNLESS OTHERWISE SPECIFIED:
TRANSISTOR RANKS ARE Q, R OR S.

NANCE SCHEMATIC DIAGRAM

NOTE : REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
 EXAMPLE : C.B.A.....R2, REF. NO. 1000
 SERIES SCHEMATIC DIAGRAM.....
 1002 (1002 IS ABBREVIATED
 TO R2)

VOLTAGE MEASUREMENT :
 COLOR BAR SIGNAL IN SP REC MODE WITH IN
 BRACKET.
 COLOR BAR SIGNAL IN SP PLAY MODE WITH OUT
 BRACKET.



SERVO & CHROMINANCE C.B.A. VEPS0228A

IMPORTANT SAFETY NOTICE :
COMPONENTS IDENTIFIED BY THE SIGN Δ HAVE
SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY.
WHEN REPLACING ANY OF THESE COMPONENTS, USE
ONLY THE SPECIFIED PARTS.

VOLTAGE MEASUREMENT

F
E
D
C
B

P2001

1	PG 30Hz
2	
3	MAIN COIL 3
4	MAIN COIL 2
5	MAIN COIL 1
6	MAIN COIL COMMON
7	POSITION COIL 3
8	POSITION COIL 2
9	POSITION COIL 1
10	POSITION COIL COMMON
11	GND
12	OSC

P2002

1	REG +12V
2	GND
3	UNREG +11V
4	REG +5V
5	GND
6	UNREG +22V
7	GND
8	UNREG +19V

P2003

1	OSC
2	POSITION COIL COMMON
3	POSITION COIL 1
4	POSITION COIL 2
5	MAIN COIL 1
6	MAIN COIL 2
7	MAIN COIL 3
8	MAIN COIL COMMON

P2005

1	TURN OVER PULSE
2	CAP \odot REVERSE \oplus
3	CYL \odot ON \oplus
4	CYL \odot LOCK \odot
5	SLP \oplus
6	POWER STOP \oplus
7	CAP \odot ON \odot
8	STILL \oplus
9	REEL \odot CONTROL
10	PAUSE \oplus
11	LP/SLP \oplus
12	CAP \odot FG1

P2004

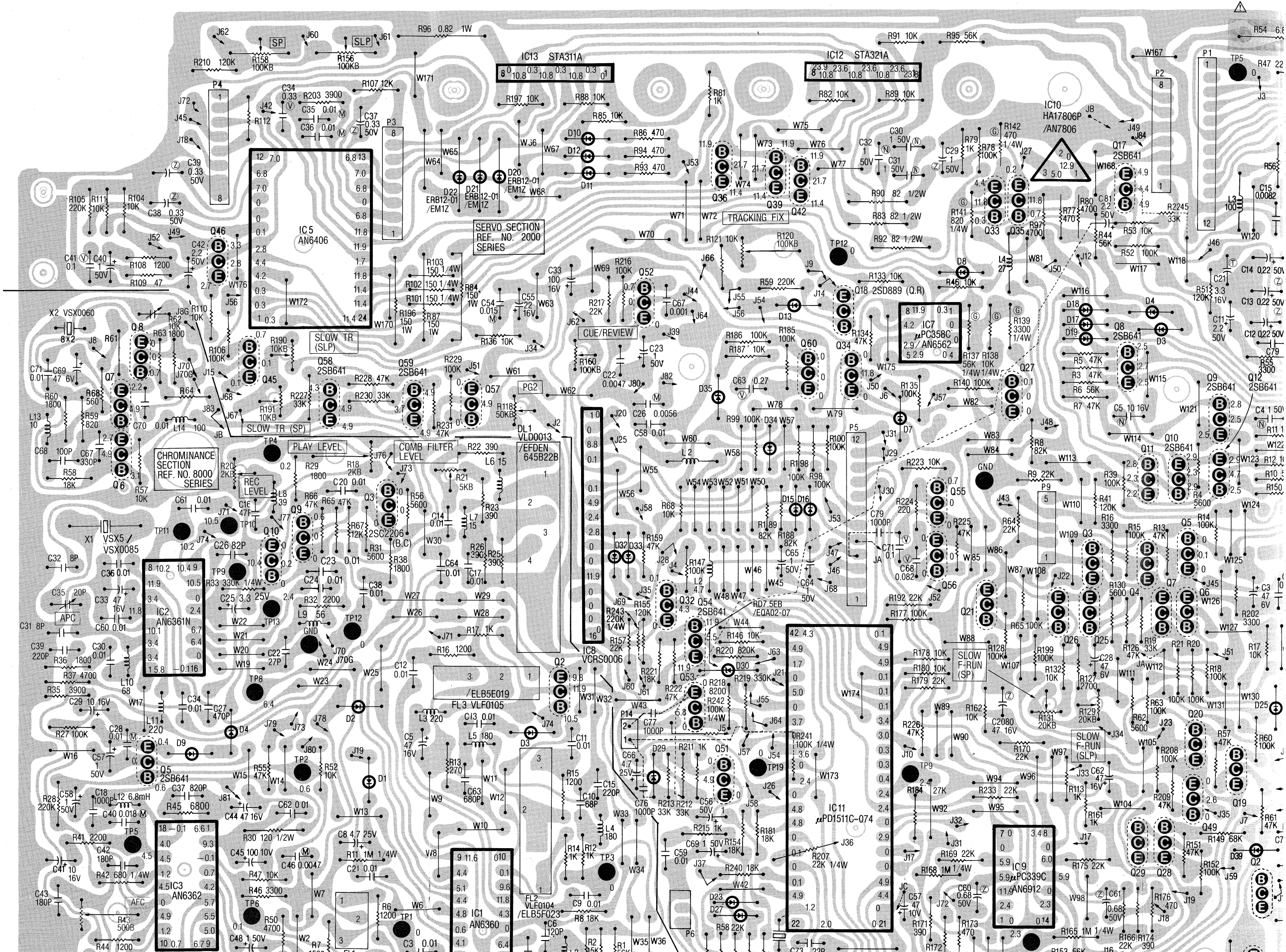
1	
2	VCC
3	POSITION COIL 3
4	CAP \odot FG 1
5	LED (FG)
6	CAP \odot FG2
7	GND
8	GND

P2006

1	SLOW SPEED UP \odot
2	SLOW SPEED DOWN \odot
3	GND

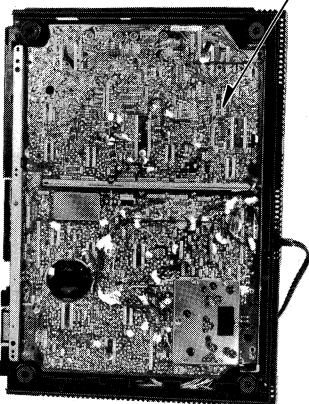
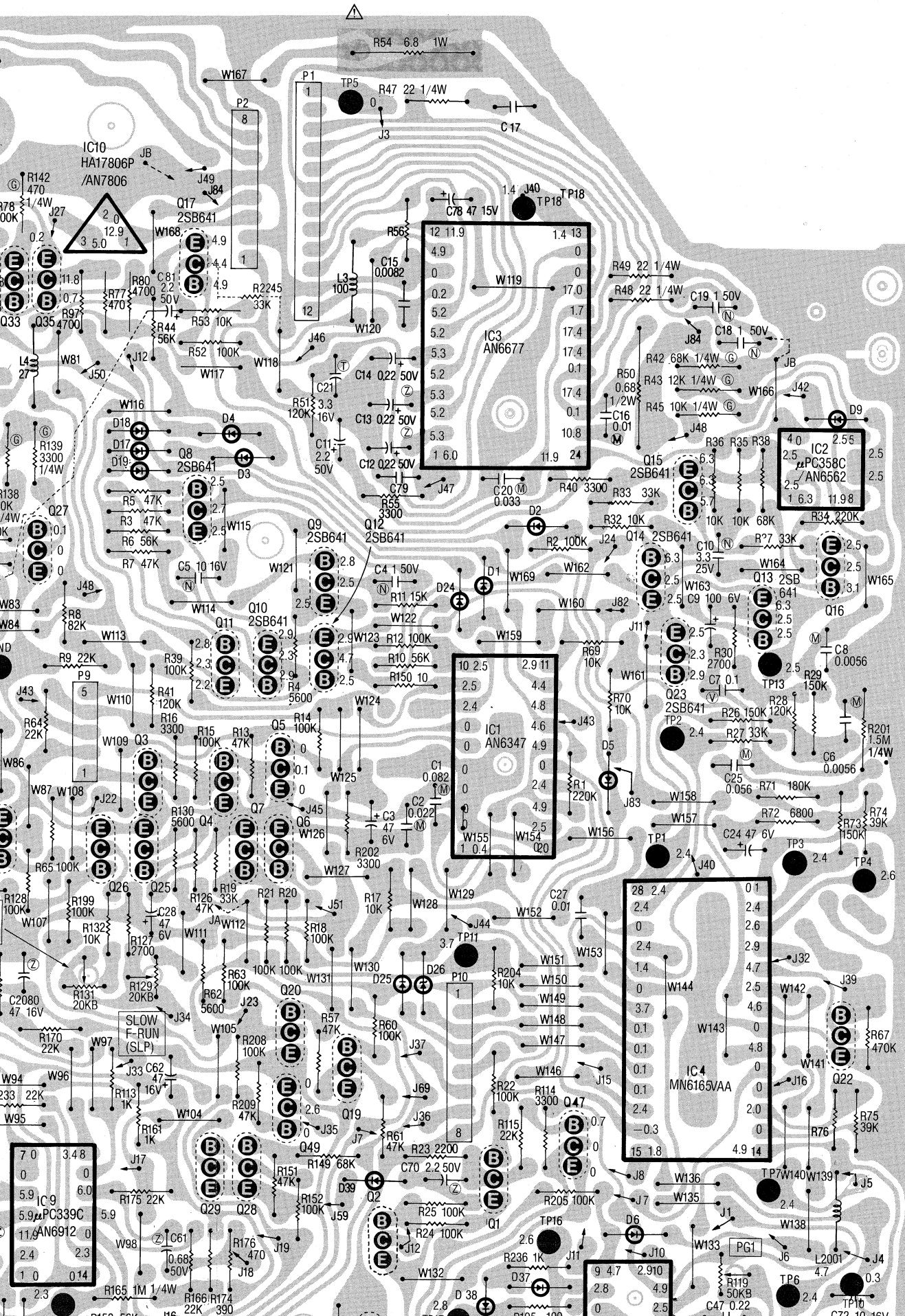
P2007

1	
2	TRACKING
3	TRACKING
4	SLOW TRACKING



VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL IN SP REC MODE.

SERVO & CHROMINANCE C.B.A.



SERVO SLOW STILL & CHROMINANCE C.B.A.	
Q2001	8-B
Q2002	7-B
Q2003	7-C
Q2004	7-C
Q2005	7-C
Q2006	7-C
Q2007	7-C
Q2008	7-D
Q2009	7-D
Q2010	7-D
Q2011	7-D
Q2012	7-D
Q2013	9-D
Q2014	8-D
Q2015	8-D
Q2016	9-D
Q2017	7-E
Q2018	6-D
Q2019	7-B
Q2020	7-C
Q2021	6-C
Q2022	9-B
Q2023	8-D
Q2024	7-A
Q2025	7-C
Q2026	7-C
Q2027	6-C
Q2028	7-B
Q2029	7-B
Q2030	8-A
Q2031	7-A
Q2032	5-C
Q2033	6-F
Q2034	6-D
Q2035	6-E
Q2036	5-E
Q2039	5-E
Q2042	5-E
Q2045	3-D
Q2046	3-E
Q2047	8-B
Q2049	7-B
Q2051	5-B
Q2052	5-E
Q2053	5-C
Q2054	5-C
Q2055	5-D
Q2056	5-C
Q2057	4-D
Q2058	3-D
Q2059	4-D
Q2060	5-D
Q8001	4-A
Q8002	4-C
Q8003	3-D
Q8005	2-B
Q8006	2-D
Q8007	2-D
Q8008	2-D
Q8009	3-D
Q8010	3-C
Q8013	3-A

P2010	
1	CAP M SPEED 2 ¹
2	CAP M SPEED 2 ²
3	CAP M SPEED 2 ³
4	CAP M SPEED 2 ³
5	CUE REVIEW (H)
6	SLOW (H)
7	FRAME ADV (H)
8	

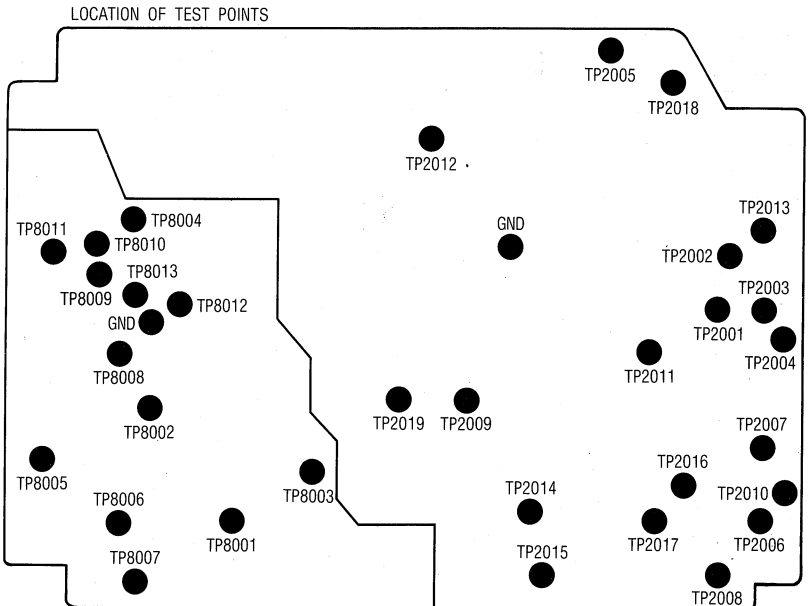
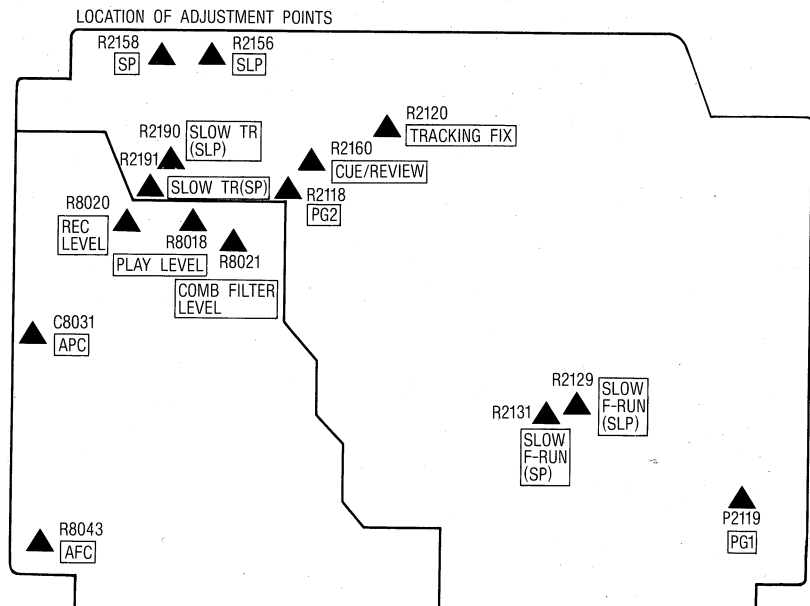
P2011	
1	ARTIFICIAL V SYNC
2	LP (H)
3	GND
4	SLOW/STILL (L)
5	SLP (H)
6	DELAY REC (H)

P2012	
1	CUE/REVIEW (H)
2	LP/SLP (H)
3	STILL (H)
4	REG +5V
5	LP/SLP (H)
6	V CORRECTION
7	PG 30HZ
8	REC+5V

P2013	
1	CONTROL HEAD (GND)
2	CONTROL HEAD

P2014	
1	PG 30Hz
2	TRACKING

P8001	
1	RF
2	EE (H)
3	ACK

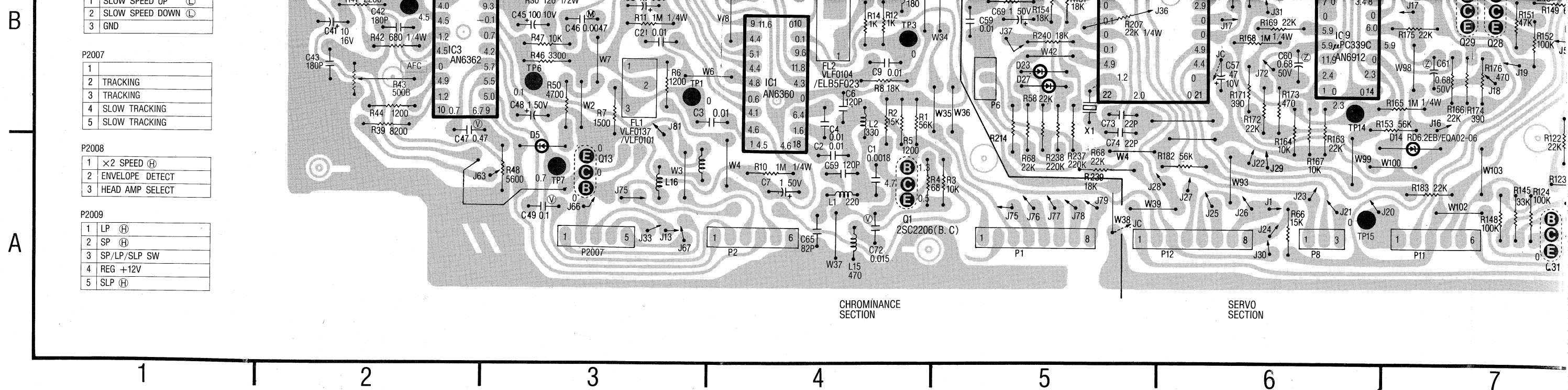


PIN NO.		IC8001			
		STOP	REC	PLAY	REV
PIN 1	4.6	4.6	4.6	4.6	4.6
PIN 2	4.6	4.6	4.6	4.6	4.6
PIN 3	4.0	4.1	4.0	4.0	4.0
PIN 4	6.2	0.6	1.3	1.1	1.2
PIN 5	5.0	4.8	5.0	4.9	4.9
PIN 6	4.4	4.4	4.4	4.4	4.4
PIN 7	5.1	5.1	5.1	5.1	5.1
PIN 8	4.6	4.4	4.6	4.6	4.6
PIN 9	3.5	11.6	3.5	3.5	3.5
PIN 10	1.7	0	1.7	1.8	1.7
PIN 11	0.1	0.1	0.1	0.1	0.1
PIN 12	9.6	9.6	9.6	9.6	9.6
PIN 13	11.8	11.8	11.8	11.8	11.8
PIN 14	4.3	4.3	4.3	4.3	4.3
PIN 15	0	0	0	0	0
PIN 16	6.4	6.4	6.4	6.4	6.4
PIN 17	1.5	1.6	1.5	1.5	1.5
PIN 18	4.5	4.6	4.5	4.5	4.5

PIN NO.		IC8002			
		STOP	REC	PLAY	REV
PIN 1	5.8	5.8	5.8	5.8	5.8
PIN 2	3.4	3.4	3.4	3.4	3.4
PIN 3	3.4	3.4	3.4	3.4	3.4
PIN 4	10.2	10.1	10.1	10.1	10.1
PIN 5	11.8	11.8	11.8	11.8	11.8
PIN 6	3.4	3.4	3.4	3.4	3.4
PIN 7	0	11.9	0.1	0.1	0.1
PIN 8	10.2	10.2	10.2	10.2	10.2
PIN 9	10.4	10.4	10.4	10.4	10.4
PIN 10	10.5	10.5	10.5	10.5	10.5
PIN 11	0	0	0	0	0
PIN 12	2.9	2.4	2.4	2.3	2.3
PIN 13	6.4	6.7	6.4	6.4	6.4
PIN 14	6.4	6.4	6.4	6.4	6.4
PIN 15	0	0	0	0	0
PIN 16	0	-0.1	-0.1	0	0

TP NO.		STOP	REC	PLAY	REV
TP8001	0	0	0	0	0
TP8002	6.2	0.6	1.3	1.6	1.6
TP8003	0	0	0	0	0
TP8004	0.2	0.2	0.2	0.2	0.2
TP8005	4.5	4.5	4.5	4.5	4.5
TP8006	0	0.1	-0.1	-0.2	-0.2
TP8007	0.7	0.7	0.7	0.7	0.7

PIN NO.		STOP	REC	PLAY	REV
PIN 1	6.6	6.6	6.6	6.6	6.6
PIN 2	9.3	9.3	9.3	9.3	9.3
PIN 3	0	-0.1	-0.1	0.8	0.8
PIN 4	0.7	0.7	0.7	0.7	0.7
PIN 5	1.5	4.2	4.1	4.1	4.1
PIN 6	5.7	5.7	5.7	5.6	5.6
PIN 7	5.5	5.5	5.5	5.5	5.5



PIN NO.	IC2001						
	STOP	REC	PLAY	CUE(×9)	REV	SLOW(1/4)	×2
PIN 1	0	0.4	0.2	4.6	4.6	0.3	0.2
PIN 2	0	0	0	0	0	0	0
PIN 3	0	0	0	0	0	0	0
PIN 4	0	0	0	0	0	0	0
PIN 5	0	0	0	0	0	0	0
PIN 6	0	0	0	0	0	0	0
PIN 7	0.1	0	0.1	0.1	0.1	0.1	0.1
PIN 8	1.2	2.4	2.4	2.4	2.4	1.5	2.4
PIN 9	2.5	2.5	2.5	2.5	2.5	2.5	2.5
PIN 10	2.7	2.5	2.5	2.5	2.5	2.6	2.5
PIN 11	0.8	2.9	2.9	2.9	2.9	1.3	2.9
PIN 12	4.9	4.4	0.3	0.2	0.2	0.2	0.3
PIN 13	4.8	4.8	4.8	4.8	4.8	4.8	4.8
PIN 14	0.5	4.6	4.6	4.6	4.6	0.5	4.6
PIN 15	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 16	0.1	-0.3	0	0.7	-0.3	0	-0.1
PIN 17	★	2.4	2.4	2.4	2.4	★	2.5
PIN 18	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 19	2.5	2.5	2.5	2.5	2.5	2.5	2.5
PIN 20	0	0	0	0	0	0	0

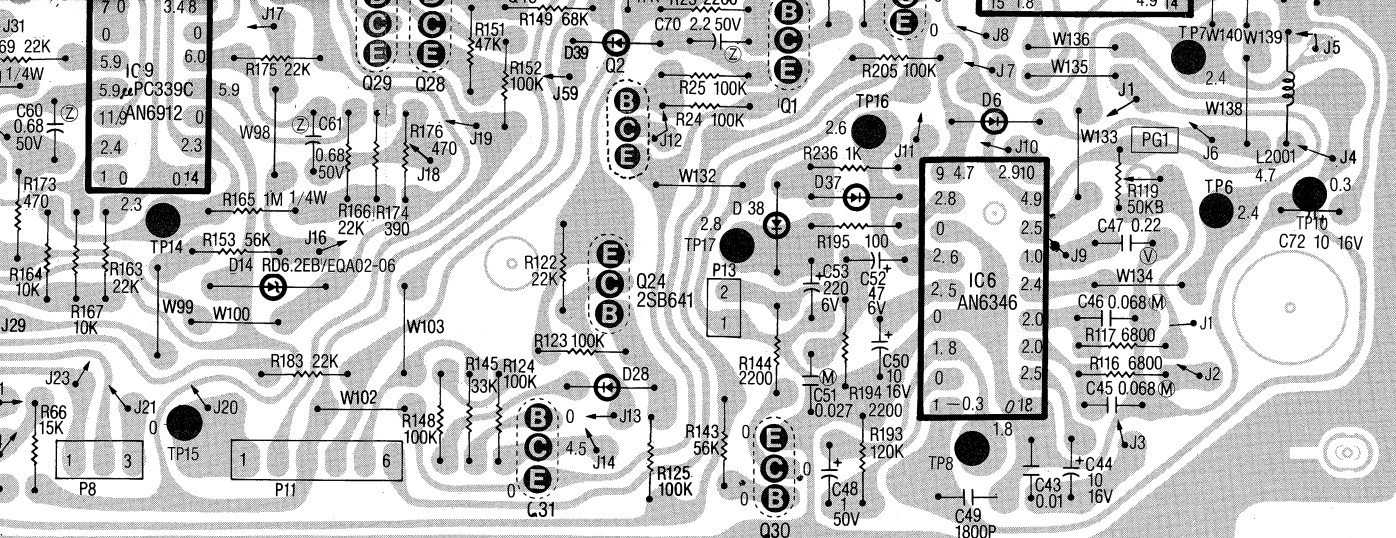
PIN NO.	IC2002						
	STOP	REC	PLAY	CUE(×9)	REV	SLOW(1/4)	×2
PIN 1	0.7	6.3	6.3	6.3	6.3	1.4	6.3
PIN 2	2.5	2.5	2.5	2.5	2.5	2.5	2.5
PIN 3	1.4	2.5	2.5	2.5	2.5	2.5	2.5
PIN 4	0	0	0	0	0	0	0
PIN 5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
PIN 6	2.5	2.5	2.5	2.5	2.5	2.5	2.5
PIN 7	2.5	2.5	2.5	2.5	2.5	2.5	2.5
PIN 8	12.0	11.9	11.9	11.9	11.9	11.9	11.9

PIN NO.	IC2003						
	STOP	REC	PLAY	CUE(×9)	REV	SLOW(1/4)	×2
PIN 1	2.6	6.0	6.0	6.0	6.0	6.0	6.0
PIN 2	5.0	5.3	5.3	5.3	5.3	5.3	5.3
PIN 3	5.1	5.2	5.2	5.2	5.2	5.2	5.2
PIN 4	5.1	5.3	5.3	5.3	5.3	5.3	5.3
PIN 5	5.1	5.2	5.2	5.2	5.2	5.3	5.2
PIN 6	5.3	5.3	5.3	5.3	5.3	5.3	5.3
PIN 7	5.1	5.2	5.2	5.2	5.2	5.2	5.2
PIN 8	5.1	5.2	5.2	5.2	5.2	5.2	5.2
PIN 9	0.2	0.2	0.2	0.2	0.2	0.2	0.2
PIN 10	0	0	0	0	0	0	0
PIN 11	0	4.9	4.9	4.9	4.9	4.9	4.9
PIN 12	12.0	11.9	11.9	11.9	11.9	11.9	11.9
PIN 13	★	1.4	1.4	1.4	1.3	1.7	1.4
PIN 14	0	0	0.1	0.1	0.1	0.1	0.1
PIN 15	0	0	0	0	0	0	0
PIN 16	18.4	17.0	16.0	15.3	15.5	16.0	15.9
PIN 17	0	1.7	1.7	1.8	1.6	1.7	1.7
PIN 18	18.4	17.4	15.8	15.2	15.3	15.8	15.8
PIN 19	18.4	17.4	15.8	15.1	15.3	15.9	15.8
PIN 20	0	0.1	0.1	0.1	0.1	0.1	0.1
PIN 21	18.4	17.4	16.0	15.8	16.1	16.1	16.1
PIN 22	0	0.1	0.1	0.1	0	0.1	0.1
PIN 23	11.6	10.8	10.8	10.8	10.8	10.9	10.8
PIN 24	12.0	11.9	11.9	11.9	11.9	11.9	11.9

PIN NO.	IC2004						
	STOP	REC	PLAY	CUE(×9)	REV	SLOW(1/4)	×2
PIN 1	0	0	0	0	0	0	0
PIN 2	0.2	2.4	2.4	2.5	2.4	0.7	2.4
PIN 3	2.4	2.6	2.6	2.5	2.6	2.4	2.6
PIN 4	2.6	2.9	2.6	2.5	2.7	2.6	2.6
PIN 5	4.7	4.7	4.7	4.6	4.6	4.6	4.5
PIN 6	0	2.5	2.5	2.7	2.4	0	2.5
PIN 7	★	4.6	0.3	0.2	0.3	0.4	0.3
PIN 8	0	0	0	0	0	0	0
PIN 9	0	0	0	0	0	0	0
PIN 10	0	4.8	0	0	0	0	0
PIN 11	0	0	0.1	0.1	0.1	0.1	0.1
PIN 12	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PIN 13	0	0	0	0	0	0	0
PIN 14	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 15	1.8	1.8	1.8	1.8	1.8	1.8	1.8
PIN 16	0.1	-0.3	0	-0.4	0.6	0	0.1
PIN 17	★	2.4	2.4	2.4	2.4	★	2.5
PIN 18	0.1	0.1	0.1	0.1	4.3	1.3	0.1
PIN 19	0.1	0.1	0.1	4.9	4.9	0.1	0.1
PIN 20	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PIN 21	0.1	0.1	0.1	0.1	0.1	0.1	4.2
PIN 22	3.7	3.7	3.7	3.7	3.7	0.1	0.1
PIN 23	0	0	0	0	0	0	0
PIN 24	★	1.4	1.4	1.4	1.3	1.4	1.4
PIN 25	0	2.4	2.4	2.4	2.4	2.4	2.4
PIN 26	0	0	0	0	0	0	0
PIN 27	2.4	2.4	2.4	2.3	2.5	2.4	2.4
PIN 28	0.2	2.4	2.4	2.5	2.4	2.5	2.5

PIN NO.	IC2005						
	STOP	REC	PLAY	CUE(×9)	REV	SLOW(1/4)	×2
PIN 1	0	0.3	0.3	0.4	0.4	0.3	0.3
PIN 2	0	0.3	0.3	0.4	0.3	0.3	0.3
PIN 3	0	0.3	0.3	0.4	0.3	0.3	0.3
PIN 4	1.2	4.2	4.2	4.1	4.2	1.5	4.2
PIN 5	4.3	4.4	4.4	4.4	4.4	4.3	4.4
PIN 6	1.9	2.8	2.8	2.8	2.8	2.7	2.8
PIN 7	0.1	0.1	0.1	0.1	4.3	0.2	0.1
PIN 8	0	0	0	0	0.1	0	0
PIN 9	3.1	0	0	-0.1	-0.1	★	0
PIN 10	7.0	7.0	7.0	7.0	7.0	7.0	7.0
PIN 11	6.8	6.8	6.8	6.8	6.8	6.8	6.8
PIN 12	7.1	7.0	7.0	6.9	6.9	6.9	7.0
PIN 13	6.8	6.8	6.8	6.8	6.8	6.8	6.8
PIN 14	6.8	7.0	7.0	7.0	7.0	7.0	7.0
PIN 15	6.8	6.8	6.8	6.8	6.8	6.8	6.8
PIN 16	0	0	0	0	0	0	0
PIN 17	6.8	6.8	6.8	6.8	6.8	6.8	6.8
PIN 18	11.8	11.8	11.8	11.8	11.8	11.8	11.8
PIN 19	11.9	11.9	11.9	11.9	11.9	11.9	11.9
PIN 20	0.7	1.7	1.7	1.8	1.8	1.5	1.7
PIN 21	10.8	11.8	11.8	11.8	11.8	11.1	11.8
PIN 22	11.5	11.4	11.4	11.4	11.4	11.3	11.4
PIN 23	11.5	11.4	11.4	11.4	11.4	11.3	11.4
PIN 24	11.5	11.4	11.4	11.4	11.4	11.3	11.4

	STOP			REC			PLAY			CUE(×9)			REV			SLOW(1/4)			×2		
	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C
Q2030	0	0	0	0	0	0	0	0	0	0	0.6	0	0	0.6	0	0	0	0	0	0	0
Q2031	0	0	4.5	0	0	4.5	0	0	4.5	0	0	4.5	0	0	4.5	0	0	3.5	0	0	4
Q2032	0	0.1	4.9	0	0.1	4.3	0	0.1	4.8	0	0.2	4.0	0	0.1	4.2	0	0.1	4.9	0	0.1	4.7
Q2033	4.4	0	10.8	4.4	0.3	11.8	4.4	0.3	11.8	4.4	0.5	11.8	4.4	0.4	11.8	4.5	★	11.1	4.4	0.3	11.8
Q2034	0	0.7	0.1	0	0	11.8	0	0	11.8	0	0.1	11.8	0	0.4	11.8	0	0.3	0.2	0	0	11.8
Q2035	0.1	0.7	10.8	0.2	0.7	11.8	0.2	0.7	11.8	0.2	0.7	11.8	0.2	0.7	11.8	0.4	1.0	11.7	0.2	0.7	11.8
Q2036	11.5	11.9	23.3	11.4	11.9	21.7	11.4	11.9	21.1	11.4	11.9	20.5	11.4	11.9	20.8	11.4	11.9	18.2	11.4	11.7	21.0
Q2039	11.5	11.9	23.3	11.4	11.9	21.7	11.4	11.9	21.1	11.4	11.9	20.5	11.4	11.9	20.8	11.4	11.9	18.2	11.4	11.9	20.9
Q2042	11.5	11.9	23.3	11.4	11.9	21.7	11.4	11.9	21.1	11.4	11.9	20.5	11.4	11.9	20.8	11.4	11.9	18.2	11.4	11.9	20.8
Q2045	0.1	0.7	0	0.1	0.7	0.1	0.1	0.7	0.1	0.1	0.7	0.1	4.4	3.7	4.3	0.1	0.5	-0.2	0.1	0.7	0.1
Q2046	1.9	2.5	1.7	2.7	3.3	2.8	2.7	3.2	2.8	2.6	3.2	2.8	2.6	3.2	2.8	2.1	2.7	2.7	2.6	3.2	2.8
Q2047	0	0.7	0	0	0.7	0	0	0.7	0	0	0.1	3.6	0	0.1	3.6	0	0.7	0	0	0.7	0
Q2049	0	0	2.5	0	0	2.6	0	0	2.6	0	0	0.2	0	0	0.2	0	0	★	0.6	0	0
Q2051	0	0	4.9	0	0	4.9	0	0	4.9	0	0	4.9	0	0	4.9	0	0	4.9	0	0	4.9
Q2052	0	0.7	0	0	0.7	0	0	0.7	0	0	0.7	0	0	0.7	0	0	0.7	0	0	0.6	0
Q2053	0	0	2.5	0	0	5.8	0	0	5.8	0	0	5.8	0	0	5.8	0	0.2	4.6	0	0	5.8
Q2054	11.9	11.9	2.4	11.9	11.9	5.5	11.9	11.9	5.5	11.9	11.9	5.5	11.9	11.9	5.5	11.9	11.8	6.5	11.9	11.9	5.5
Q2055	0	0.7	0	0	0.7	0	0	0.7	0	0.7	0	0	0	0	0	0	0.6	-0.1	0	0.7	0
Q2056	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.3	0	0	0
Q2057	0	0	4.9	0	0	4.9	0	0	4.9	0	0	4.9	0	0	4.9	0	0	4.9	0	0	4.9
Q2058	4.9	4.3	4.9	4.9	4.3	4.9	4.9	4.3	4.9	4.9	4.3	4.9	4.9	4.3	4.9	4.9	4.3	4.9	4.9	4.3	4.9
Q2059	4.9	4.9	3.7	4.9	4.9	3.7	4.9	4.9	3.7	4.9	4.9	3.7	4.9	4.9	3.7	4.9	4.9	3.8	4.9	4.9	3.7
Q2060	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0.2	0	0	0	★	0	0	0



UNLESS OTHERWISE SPECIFIED
TRANSISTORS ARE 2SD636(Q, R, S),
TRANSISTOR RANKS ARE Q, R OR S AND
DIODES ARE MA165/ISS119.

1 CONTROL HEAD (GND)

P2014

1 PG 30Hz
2 TRACKING

P8001

1 RF
2 EE (H)
3 ACK
4 AFC
5 PLAY CHROMA
6 REC CHROMA
7 REC +12V
8 LP CUE/REVIEW (H)

P8002

1 SYNC FRONT PULSE
2 VIDEO (FOR HSS)
3 HSS
4 DOC
5 VIDEO
6 GND

PIN 17 1.5 1.6 1.5 1.5
PIN 18 4.5 4.6 4.5 4.5 4.5

TP NO.	STOP	REC	PLAY	CUE(×9)	REV
TP8001	0	0	0	0	0
TP8002	6.2	0.6	1.3	1.6	1.6
TP8003	0	0	0	0	0
TP8004	0.2	0.2	0.2	0.2	0.2
TP8005	4.5	4.5	4.5	4.5	4.5
TP8006	0	0.1	-0.1	-0.2	-0.2
TP8007	0.7	0.7	0.7	0.7	0.7
TP8008	6.4	6.4	6.4	6.4	6.4
TP8009	10.4	10.4	10.4	10.4	10.4
TP8010	10.5	10.5	10.5	10.5	10.5
TP8011	10.2	10.2	10.2	10.2	10.2
TP8012	0	0	0	0	0
TP8013	3.0	2.4	2.4	2.3	2.3

PIN NO.	STOP	REC	PLAY	CUE(×9)	REV
PIN 1	6.6	6.6	6.6	6.6	6.6
PIN 2	9.3	9.3	9.3	9.3	9.3
PIN 3	0	-0.1	-0.1	0.8	0.8
PIN 4	0.7	0.7	0.7	0.7	0.7
PIN 5	1.5	4.2	4.1	4.1	4.1
PIN 6	5.7	5.7	5.7	5.6	5.6
PIN 7	5.5	5.5	5.5	5.5	5.5
PIN 8	5.0	5.0	5.0	5.0	5.0
PIN 9	0	6.7	5.9	5.9	5.9
PIN 10	0.7	0.7	0.7	0.7	0.7
PIN 11	2.4	1.2	1.2	1.0	1.0
PIN 12	4.9	4.9	4.9	4.9	4.9
PIN 13	0	0	0	0	0
PIN 14	4.5	4.5	4.5	4.5	4.5
PIN 15	1.2	1.2	1.2	1.2	1.2
PIN 16	4.5	4.5	4.5	4.5	4.5
PIN 17	0.1	4.0	4.0	3.9	3.9
PIN 18	0	-0.1	0.7	0	0.5

	STOP			REC			PLAY			CUE(×9)			REV		
	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C
Q8001	0.5	1.3	4.7	0.5	1.3	4.7	0.5	1.3	4.7	0.5	1.3	4.8	0.5	1.3	4.8
Q8002	7.8	10.5	11.9	9.8	10.5	11.9	9.8	10.5	11.9	9.8	10.5	11.9	9.8	10.5	11.9
Q8003	0	0	-0.4	0	0	0	0	0	-0.4	0	0.1	-0.2	0	0.1	-0.2
Q8005	3.9	6.2	0	0.4	0.6	0	1.2	1.3	0	1.2	1.5	0	1.3	1.6	0
Q8006	2.7	3.1	4.9	2.7	3.1	4.9	2.7	3.1	4.9	2.7	3.1	4.9	2.7	3.1	4.9
Q8007	2.2	2.7	4.9	2.2	2.7	4.9	2.2	2.7	4.9	2.2	2.7	4.9	2.2	2.7	4.9
Q8008	0	0	0	0	0.7	0	0	0	0	0	0	0	0	0	0
Q8009	0	0.6	0	0	0.6	0	0	0.6	0	0	0.6	0	0	0.6	0
Q8010	0	0	0.2	0	0.2	0	0	0.2	0	0	0.2	0	0	0.2	0
Q8013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

06

(×9)			REV			SLOW(1/4)			×2		
B	C	E	B	C	E	B	C	E	B	C	E
0.7	0.1	0	0.7	0.1	0	0	0	4.5	0	0	4.5
0	4.5	0	0	4.5	0	0	0	0.7	0	0	0.7
0.7	0.1	0	0.7	0.1	0	0.7	0.1	0	0.7	0.1	0
0.1	0.7	0	0.1	0.7	0	0.1	0.7	0	0.1	0.7	0
0	0.1	0	0	0.1	0	0	0.1	0	0	0.1	0
0	4.4	0	0	4.4	0	0	0.6	0	0	0.6	0
0.6	0	0	0.6	0	0	0	0.6	0	0	0.6	0
0.7	2.5	2.5	2.7	2.5	2.5	1.9	2.5	2.5	2.7	2.5	2.5
0.8	2.5	2.5	2.8	2.5	2.5	1.9	2.5	2.5	2.8	2.5	2.5
0.2	2.8	2.9	2.2	2.9	1.3	★	2.9	2.9	2.3	2.9	2.9
0.7	2.2	2.2	2.7	2.2	1.0	0.5	★	2.2	2.8	2.3	2.3
0.7	2.5	2.9	4.7	2.5	1.3	1.1	1.6	2.9	4.7	2.5	2.5
0.3	2.4	2.5	6.3	2.6	2.5	6.4	2.5	2.5	6.3	2.6	2.6
0.3	2.5	2.5	6.3	2.5	2.5	6.3	2.5	2.5	6.3	2.5	2.5
0.7	6.3	6.3	5.7	6.3	6.4	5.7	6.4	6.3	5.7	6.3	6.3
0.1	2.5	2.5	3.1	2.5	2.5	3.1	2.5	2.5	3.1	2.5	2.5
0.8	0.1	4.9	4.8	0.2	4.9	4.8	0.2	4.9	4.8	0.2	4.9
0.2	2.9	4.5	0	2.9	3.5	0.1	1.0	4.5	0	2.9	2.9
0.1	2.8	0	0.1	2.8	0	0.1	2.8	0	0.6	0	0.6
0.6	0	0	0.6	0	0	0.6	0.1	0	0.1	4.2	4.2
0.1	7.3	0	0.1	7.3	0	0.1	7.3	0	0.1	7.3	7.3
0.1	4.6	0	0.1	4.6	0	-1.2	4.6	0	-1.2	4.6	4.6
0.8	2.3	2.5	2.9	2.4	2.5	1.8	2.5	2.5	2.7	2.4	2.4
0.9	4.9	4.9	4.9	4.9	4.8	4.9	4.9	4.9	4.9	4.9	4.9
0.4	4.4	0	0	4.4	0	0	4.4	0	0	4.4	4.4
0.6	0	0	0.6	0	0	0.6	0	0	0.6	0	0.6
0	0.1	0	0	0.1	0	0.1	0.3	0	0	0.1	0.1
0.6	0	0	0.6	0	0	0	0.1	0	0.6	0	0.6
0	0.1	0	0	0.1	0	0.1	0	0	0	0.1	0.1

(×9)			REV			SLOW(1/4)			×2		
B	C	E	B	C	E	B	C	E	B	C	E
0.6	0	0	0.6	0	0	0	0	0	0	0	0
0	4.5	0	0	4.5	0	0	3.5	0	0	4.4	4.4
0.2	4.0	0	0.1	4.2	0	0.1	4.9	0	0.1	4.7	4.7
0.5	11.8	4.4	0.4	11.8	4.5	★	11.1	4.4	0.3	11.8	11.8
0.1	11.8	0	0.1	11.8	0	0.3	0.2	0	0	11.8	11.8
0.7	11.8	0.2	0.7	11.8	0.4	1.0	11.7	0.2	0.7	11.8	11.8
0.9	20.5	11.4	11.9	20.8	11.4	11.9	18.2	11.4	11.7	21.0	21.0
0.9	20.5	11.4	11.9	20.8	11.4	11.9	18.2	11.4	11.9	20.9	20.9
0.9	20.5	11.4	11.9	20.8	11.4	11.9	18.2	11.4	11.9	20.8	20.8
0.7	0.1	4.4	3.7	4.3	0.1	0.5	-0.2	0.1	0.7	0.1	0.1
0.2	2.8	2.6	3.2	2.8	2.1	2.7	2.7	2.6	3.2	2.8	2.8
0.1	3.6	0	0.1	3.6	0	0.7	0	0	0.7	0	0
0	0.2	0	0	0.2	0	0	★	0.6	0	0	0
0	4.9	0	0	4.9	0	0	4.9	0	0	4.9	4.9
0.7	0	0	0.7	0	0	0.7	0	0	0.6	0	0.6
0	5.8	0	0	5.8	0	0.2	4.6	0	0	5.8	5.8
0.9	5.5	11.9	11.9	5.5	11.9	11.8	6.5	11.9	11.9	5.5	5.5
0	0	0	0	0	0.6	-0.1	0	0	0.7	0	0
0	0	0	0	0	0	-0.3	0	0	0	0	0
0	4.9	0	0	4.9	0	0	4.9	0	0	4.9	4.9
0.3	4.9	4.9	4.3	4.9	4.9	4.3	4.9	4.9	4.3	4.9	4.9
0.9	3.7	4.9	4.9	3.7	4.9	4.9	3.8	4.9	4.9	3.7	3.7
0.2	0	0	0.2	0	0	0	★	0	0	0	0

PIN NO.	IC2006						
	STOP	REC	PLAY	CUE(×9)	REV	SLOW(1/4)	×2
PIN 1	0.1	-0.3	0	-0.4	0.3	0	-0.1
PIN 2	0.3	0	0.2	-0.5	0.5	0.2	-0.4
PIN 3	1.1	1.8	1.1	1.4	1.3	1.1	1.1
PIN 4	0	0	0	0	0	0	0
PIN 5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
PIN 6	2.5	2.6	2.5	2.5	2.5	2.5	2.5
PIN 7	0	0	0	0	0	0	0
PIN 8	2.5	2.8	2.5	2.5	2.5	2.5	2.5
PIN 9	0.2	4.7	0.2	0.2	0.2	0.2	0.2
PIN 10	0	2.9	3.0	2.4	2.4	4.9	3.0
PIN 11	4.9	4.9	4.9	4.9	4.9	4.9	4.9
PIN 12	0	2.5	2.4	2.4	2.4	0	2.4
PIN 13	0	1.0	1.0	0.8	0.7	4.9	1.0
PIN 14	0	2.4	2.4	-2.4	2.4	2.4	2.4
PIN 15	0	2.0	2.0	2.1	2.1	2.1	2.1
PIN 16	4.8	2.0	2.0	2.1	2.1	2.1	2.1
PIN 17	2.5	2.5	2.5	2.5	2.5	2.5	2.5
PIN 18	0	0	0	0	0	0	0

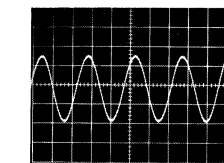
PIN NO.	IC2009						
	STOP	REC	PLAY	CUE(×9)	REV	SLOW(1/4)	×2
PIN 1	0	0	0	0	0	0	0
PIN 2	0	2.4	2.4	2.4	2.3	★	2.4
PIN 3	11.9	11.9	11.9	11.9	11.9	11.9	11.9
PIN 4	5.9	5.9	5.9	6.0	6.0	6.0	6.0
PIN 5	5.9	5.9	5.9	6.0	6.0	6.0	6.0
PIN 6	0	0	0	0	0	0	0
PIN 7	0	0	0	0	0	0	0
PIN 8	3.4	3.4	3.4	3.4	3.4	3.4	3.4
PIN 9	0	0	0	0	0	0.1	0
PIN 10	5.9	6.0	5.9	6.0	6.0	6.0	6.0
PIN 11	5.9	5.9	5.9	6.0	6.0	6.0	6.0
PIN 12	0	0	0	0	0	0	0
PIN 13	0	2.3	2.4	2.3	2.3	★	2.4
PIN 14	0	0	0	0	0	0	0

PIN NO.	IC2012						
	STOP	REC	PLAY	CUE(×9)	REV	SLOW(1/4)	×2
PIN 1	25.2	23.8	21.5	20.9	21.3	19.0	21.5
PIN 2	25.2	23.6	21.2	20.6	21.1	18.9	21.2
PIN 3	1.9	10.8	10.9	10.9	10.9	8.0	10.9
PIN 4	25.2	23.6	21.2	20.6	21.1	18.8	21.2
PIN 5	1.9	10.8	10.9	10.8	10.9	8.0	10.9
PIN 6	25.2	23.6	21.2	20.6	21.1	18.8	21.2
PIN 7	1.9	10.8	10.9	10.9	10.9	8.0	10.9
PIN 8	25.2	23.9	21.4	20.9	21.3	19.0	21.5

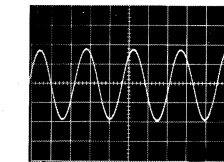
LUMINANCE & AUDIO [I] SCHEMATIC DIAGRAM

NOTE : REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
EXAMPLE : C.B.A.....R2, REF. NO. 3000
SERIES SCHEMATIC DIAGRAM.....
3002 (3002 IS ABBREVIATED
TO R2)

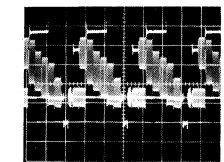
NOTE : REF. NO. ON
EXAMPLE : C.
SE
3
TC



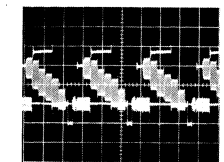
TP4001 REC/SP.
0.2V/1msec. div.



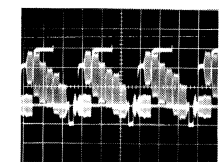
TP4001 P.B/SP.
0.2V/1msec. div.



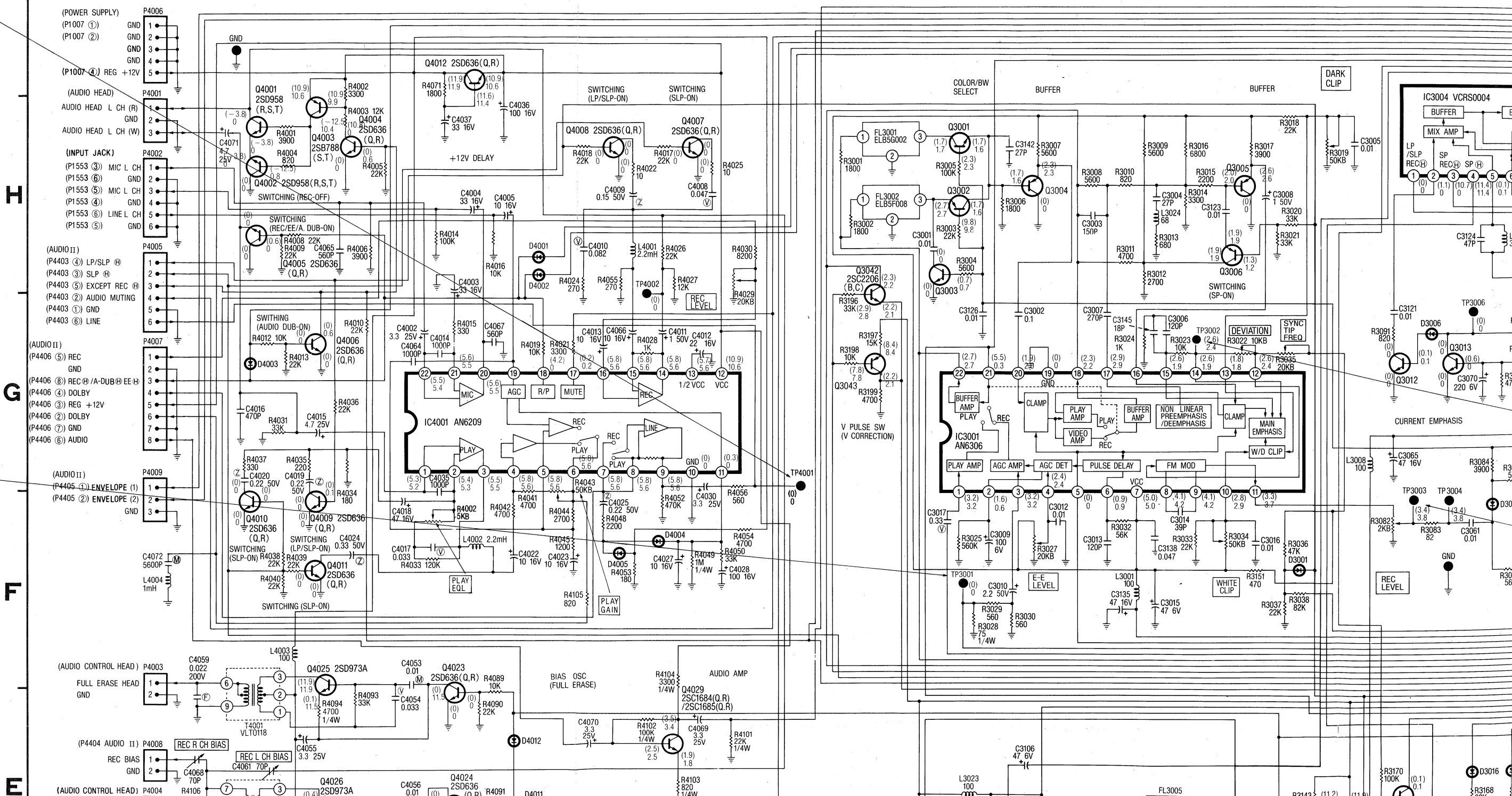
TP3001 STOP.
0.2V/20μsec. div.



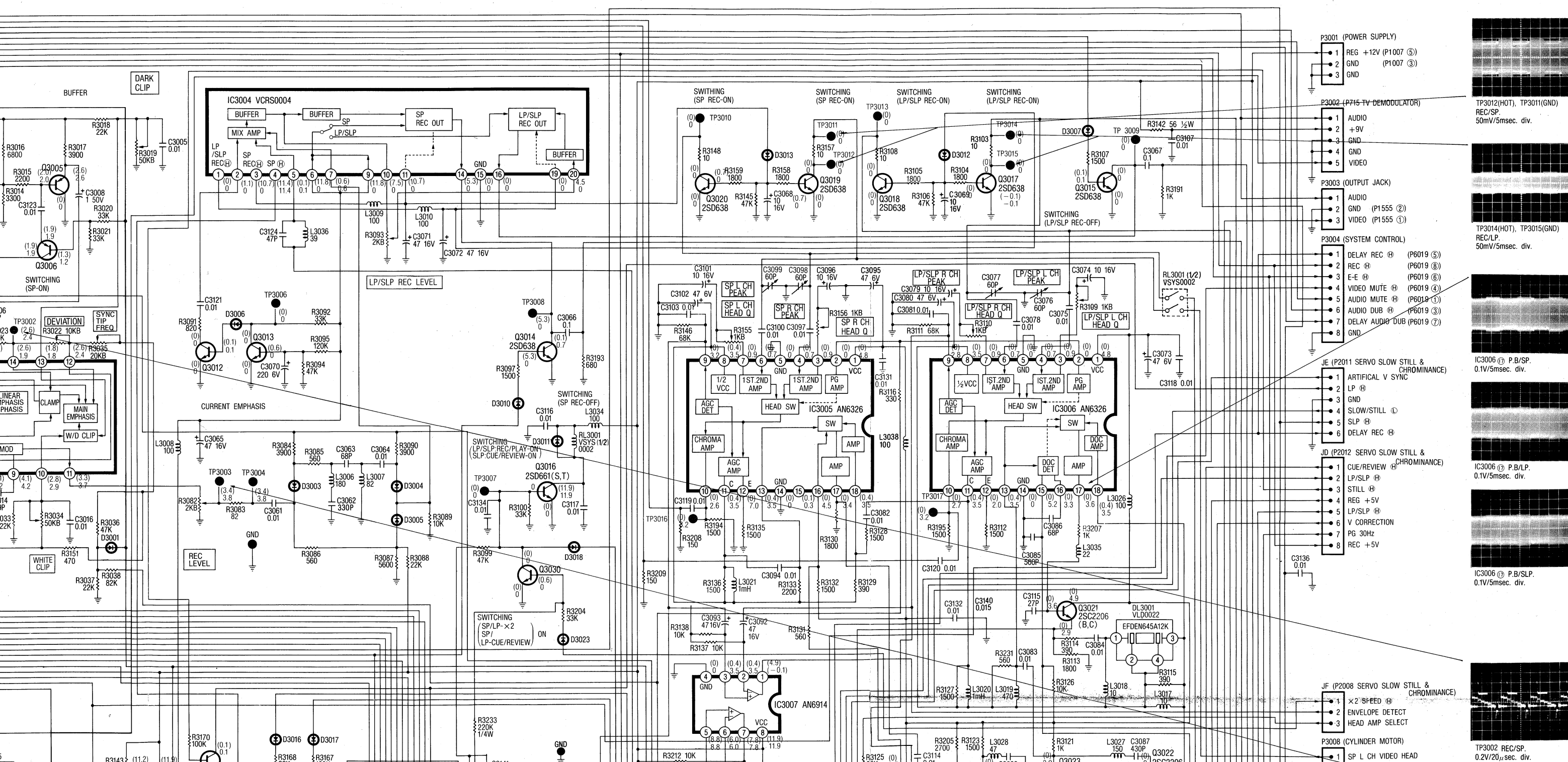
TP3018 STOP.
0.5V/20μsec. div.



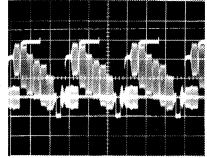
TP3018 STOP.
0.5V/20μsec. div.



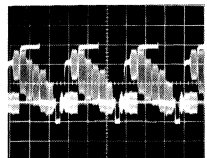
VOLTAGE MEASUREMENT :
 COLOR BAR SIGNAL IN SP REC MODE WITH IN
 BRACKET.
 COLOR BAR SIGNAL IN SP PLAY MODE WITH OUT
 BRACKET.



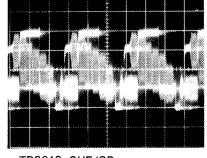
TP3018 STOP.
0.5V/20 μ sec. div.



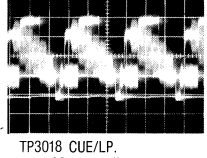
TP3018 P.B/SP.
0.5V/20 μ sec. div.



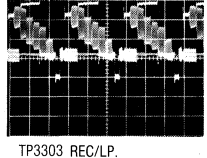
TP3018 P.B/LP.
0.5V/20 μ sec. div.



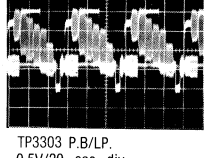
TP3018 CUE/SP.
0.5V/20 μ sec. div.



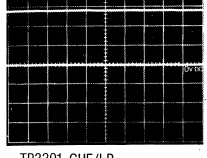
TP3018 CUE/LP.
0.5V/20 μ sec. div.



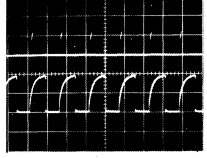
TP3303 REC/LP.
0.5V/20 μ sec. div.



TP3303 P.B/LP.
0.5V/20 μ sec. div.



TP3301 CUE/LP.
1V/1msec. div.



IC3303 CUE/LP.
5V/20 μ sec. div.

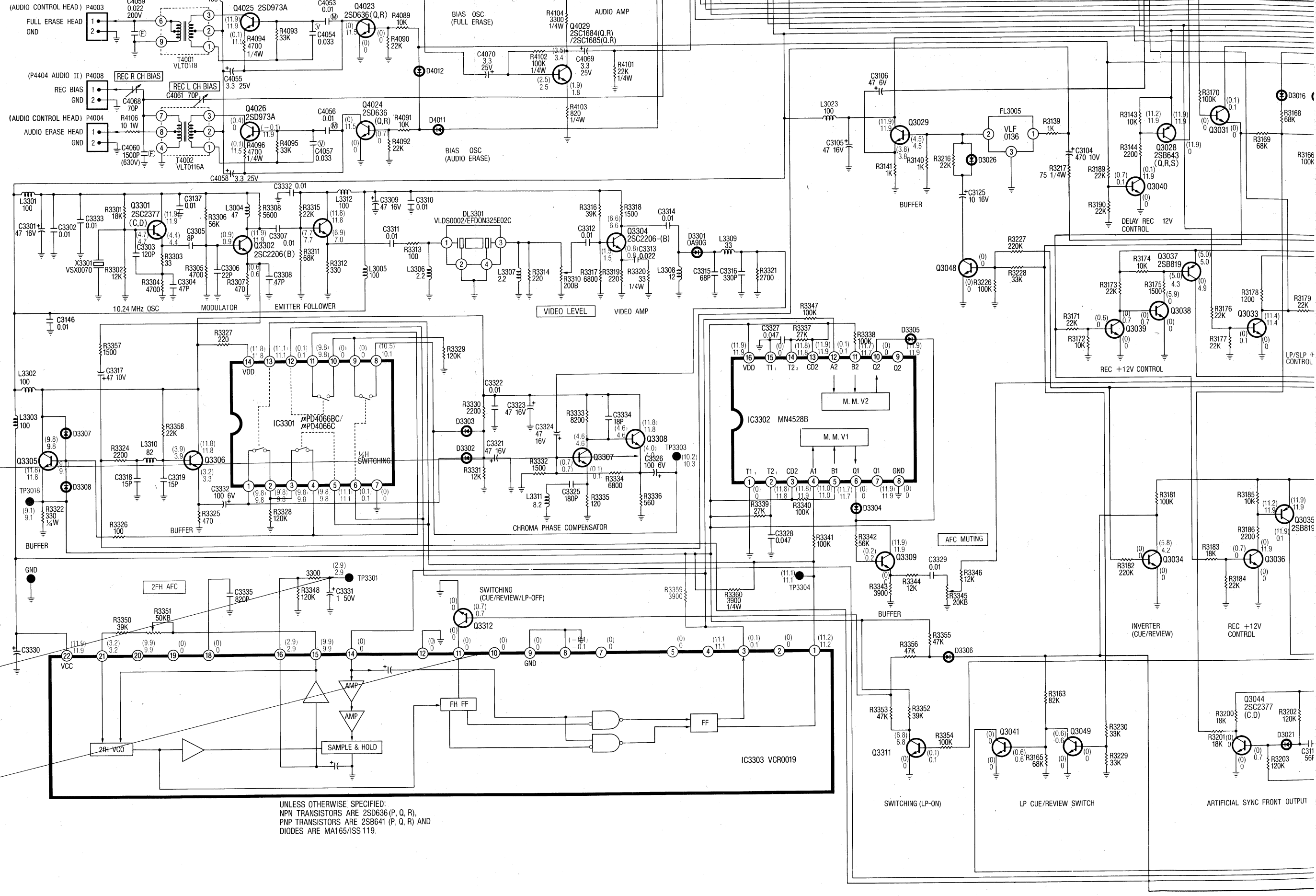
E

D

C

B

A



UNLESS OTHERWISE SPECIFIED:
NPN TRANSISTORS ARE 2SD636 (P, Q, R),
PNP TRANSISTORS ARE 2SB641 (P, Q, R) AND
DIODES ARE MA165/ISS 119.

1

2

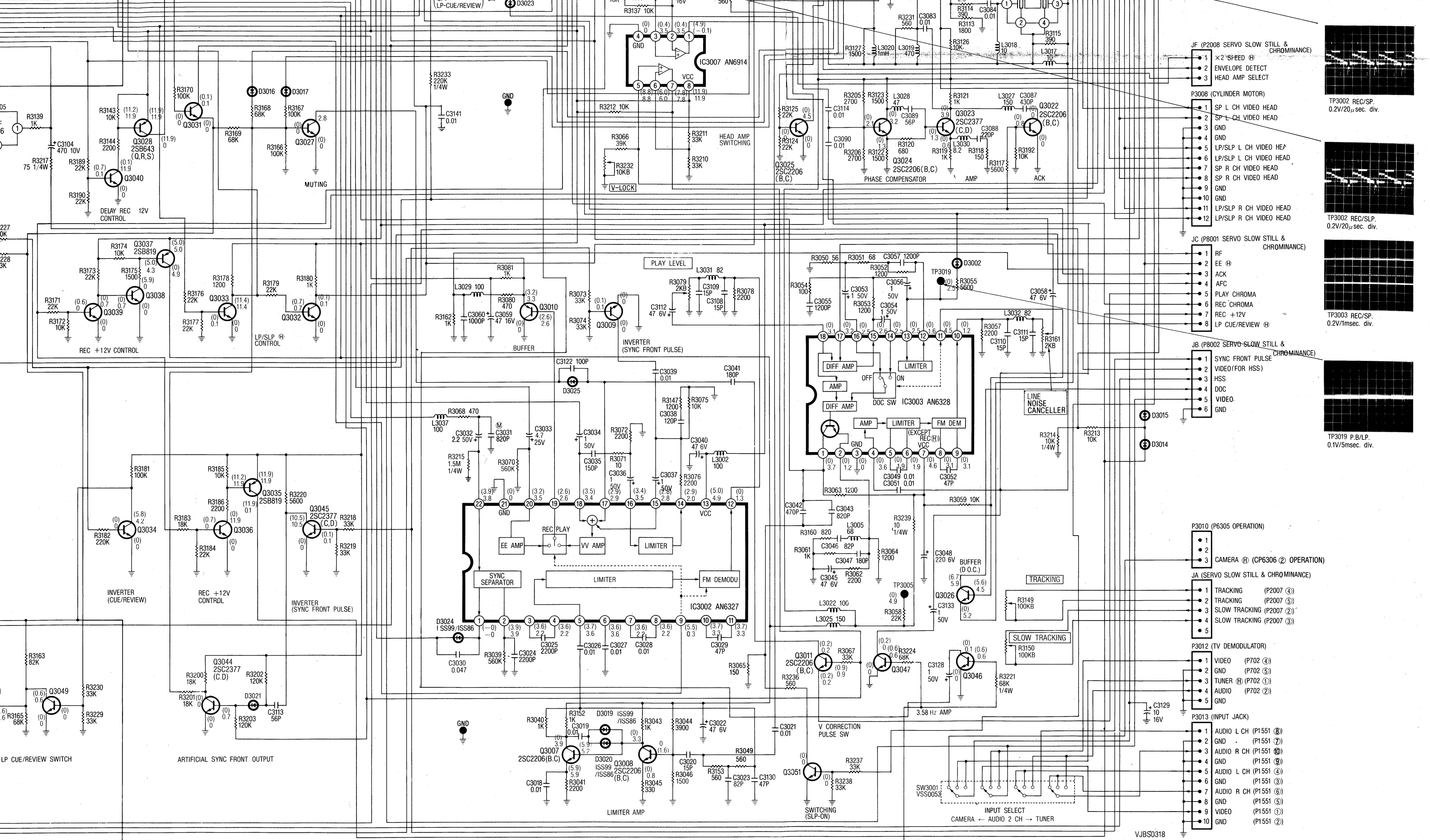
3

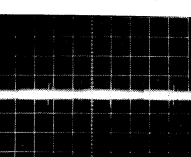
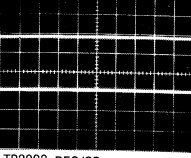
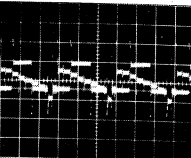
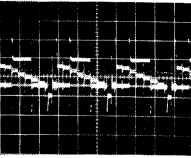
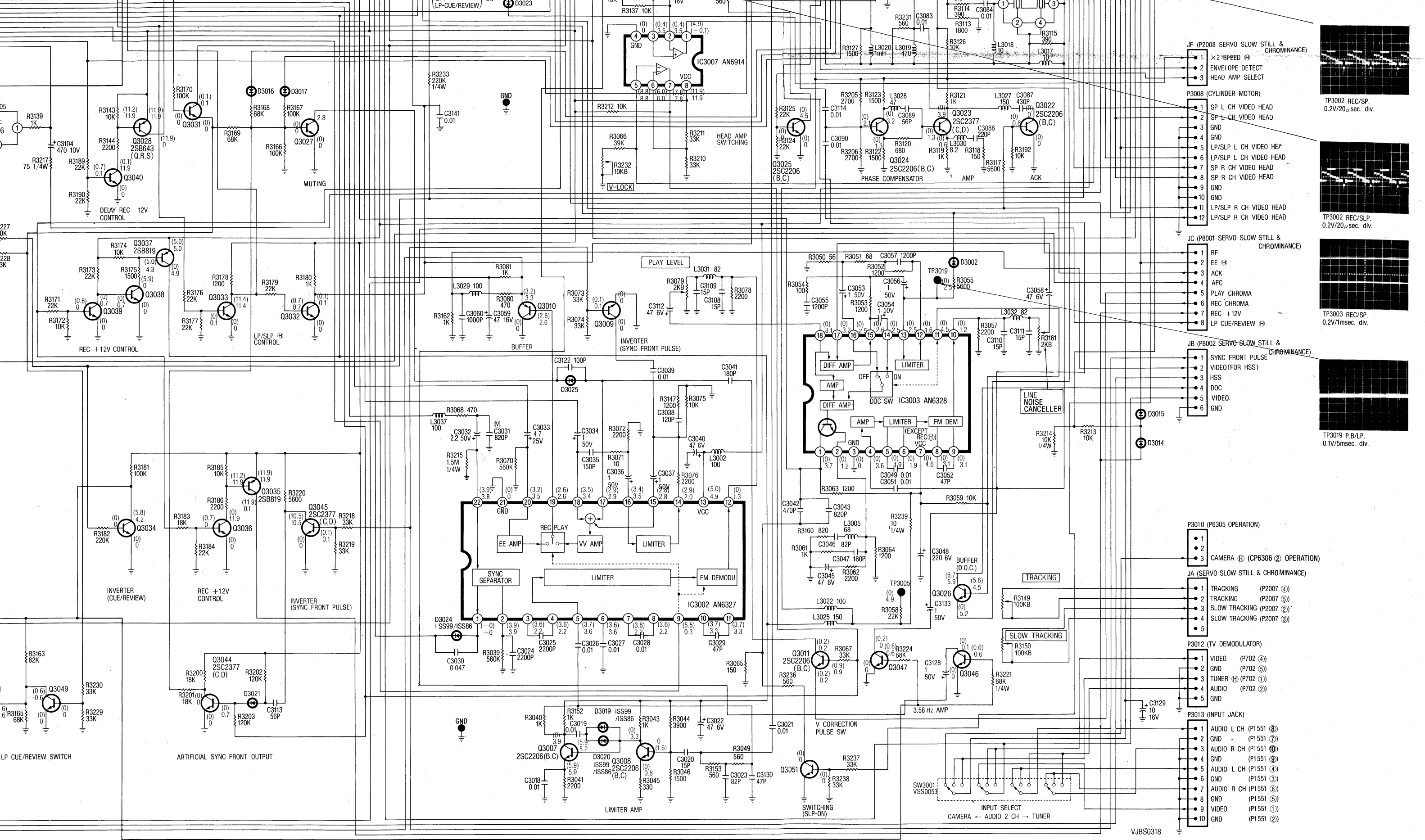
4

5

6

7





	IC3001				
	STOP	REC	PLAY	CUE(×9)	REV
PIN 1	3.2	3.2	3.2	3.2	3.2
PIN 2	1.6	1.6	0.6	★	★
PIN 3	3.2	3.2	3.2	3.2	3.2
PIN 4	2.3	2.4	2.4	2.3	2.3
PIN 5	0	0	0	0	0
PIN 6	0.9	0.9	0.9	0.9	0.9
PIN 7	5.0	5.0	5.0	5.0	5.0
PIN 8	4.1	4.1	4.2	4.2	4.2
PIN 9	4.1	4.1	4.2	4.2	4.2
PIN 10	2.7	2.8	2.7	2.7	2.7
PIN 11	3.3	3.3	3.7	3.7	3.7
PIN 12	2.0	2.4	2.4	2.4	2.4
PIN 13	1.8	1.8	1.8	1.8	1.8
PIN 14	2.6	2.6	1.9	2.4	2.4
PIN 15	2.6	2.6	1.9	2.4	2.4
PIN 16	1.9	1.9	1.9	1.9	1.9
PIN 17	2.9	2.9	2.9	2.9	2.9
PIN 18	2.2	2.3	2.2	2.2	2.2
PIN 19	0	0	0	0	0
PIN 20	1.9	1.9	2.0	2.0	2.0
PIN 21	2.5	5.5	0.3	0.2	0.2
PIN 22	2.7	2.7	2.7	2.7	2.7

PIN NO.	IC3002				
	STOP	REC	PLAY	CUE($\times 9$)	REV
PIN 1	0	0	0	0	0
PIN 2	3.9	3.9	3.9	3.9	3.9
PIN 3	2.1	3.6	2.2	2.2	2.2
PIN 4	2.1	3.6	2.2	2.2	2.2
PIN 5	3.6	3.7	3.6	3.6	3.6
PIN 6	3.6	3.7	3.6	3.6	3.6
PIN 7	2.2	3.6	2.2	2.2	2.2
PIN 8	2.2	3.6	2.2	2.2	2.2
PIN 9	2.5	3.5	0.3	0.2	0.2
PIN 10	3.3	3.7	3.3	3.3	3.3
PIN 11	3.4	3.7	3.3	3.3	3.3
PIN 12	1.2	0	1.3	1.3	1.3
PIN 13	4.9	5.0	4.9	4.9	4.9
PIN 14	2.0	2.9	2.0	2.0	2.0
PIN 15	2.8	2.8	2.8	2.8	2.8
PIN 16	3.4	3.4	3.5	3.4	3.4
PIN 17	2.9	2.9	2.9	2.8	2.8
PIN 18	3.5	3.5	3.4	3.5	3.5
PIN 19	2.6	2.6	2.6	2.6	2.6
PIN 20	3.2	3.2	3.5	3.6	3.6
PIN 21	0	0	0	0	0
PIN 22	3.9	3.9	3.8	3.8	3.8

PIN NO.	IC3005				
	STOP	REC	PLAY	CUE(×9)	REV
PIN 1	4.8	0	4.8	4.8	4.8
PIN 2	4.8	0	0	0	0
PIN 3	0.9	0	0.9	0.9	0.9
PIN 4	0.7	0	0.7	0.7	0.7
PIN 5	0	0	0	0	0
PIN 6	0.7	0	0.7	0.7	0.7
PIN 7	0.9	0	0.9	0.9	0.9
PIN 8	3.5	0.4	3.5	3.5	3.5
PIN 9	2.2	0	3.2	3.0	2.9
PIN 10	2.6	0	2.6	2.9	2.6
PIN 11	3.5	0.4	3.5	3.5	3.5
PIN 12	2.0	0	2.0	2.0	2.0
PIN 13	3.5	0.4	3.5	3.5	3.5
PIN 14	0	0	0	0	0
PIN 15	0.3	0.1	0.3	0.1	0.1
PIN 16	4.5	0	4.5	0.3	0.3
PIN 17	3.4	0	3.4	3.4	3.4
PIN 18	3.5	0.4	3.5	3.5	3.5

PIN NO.	IC3006				
	STOP	REC	PLAY	CUE($\times 9$)	REV
PIN 1	4.8	0	4.8	4.8	4.8
PIN 2	4.8	0	0	0	2
PIN 3	0.9	0	0.9	0.9	0.9
PIN 4	0.7	0	0.7	0.7	0.7
PIN 5	0	0	0	0	0
PIN 6	0.7	0	0.7	0.7	0.7
PIN 7	0.9	0	0.9	0.9	0.9
PIN 8	3.5	0.4	3.5	3.5	3.5
PIN 9	2.2	0	2.9	3.0	3.0
PIN 10	2.6	0	2.7	2.6	2.6
PIN 11	3.5	0.4	3.5	3.5	3.5
PIN 12	2.0	0	2.0	2.0	2.0
PIN 13	3.5	0.4	3.5	3.5	3.5
PIN 14	0	0	0	0	0
PIN 15	0.8	0	5.2	5.2	5.2
PIN 16	2.3	0	3.3	3.1	3.1
PIN 17	3.6	0	3.6	3.6	3.6
PIN 18	3.5	0.4	3.5	3.5	3.5

PIN NO.	IC3007				
	STOP	REC	PLAY	CUE(×9)	REV
PIN 1	★	4.9	-0.1	0.2	0.2
PIN 2	3.5	0.4	3.5	3.5	3.5
PIN 3	3.5	0.4	3.5	3.5	3.5
PIN 4	0	0	0	0	0
PIN 5	8.8	8.8	8.8	8.6	8.6
PIN 6	1.0	6.0	6.0	6.0	6.0
PIN 7	7.8	7.8	7.8	7.7	7.7
PIN 8	11.9	11.9	11.9	11.9	11.9

PIN NO.	IC3301				
	STOP	REC	PLAY	CUE($\times 9$)	REV
PIN 1	9.8	9.8	9.8	9.8	9.8
PIN 2	9.8	9.8	9.8	9.8	9.8
PIN 3	9.8	9.8	9.8	9.8	9.8
PIN 4	9.8	9.8	9.8	9.8	9.8
PIN 5	11.1	11.1	11.1	11.2	11.1
PIN 6	0.1	0.1	0.1	0.1	0.1
PIN 7	0	0	0	0	0
PIN 8	10.2	10.5	10.1	10.2'	10.5
PIN 9	0	0	0	0	0
PIN 10	0	0	0	0	0
PIN 11	9.8	9.8	9.8	9.8	9.8
PIN 12	0.1	0.1	0.1	0.1	0.1
PIN 13	11.1	11.1	11.1	11.2	11.1
PIN 14	11.8	11.8	11.8	11.8	11.8

PIN NO.	IC3302				
	STOP	REC	PLAY	CUE($\times 9$)	REV
PIN 1	0	0	0	0	0
PIN 2	11.8	11.8	11.8	11.8	11.8
PIN 3	11.9	11.8	11.9	11.9	11.9
PIN 4	11.0	11.0	11.0	11.0	11.0
PIN 5	11.7	11.7	11.7	11.8	11.8
PIN 6	0	0	0	0	0
PIN 7	11.9	11.9	11.9	11.9	11.9
PIN 8	0	0	0	2	0
PIN 9	11.9	11.9	11.9	11.9	11.9
PIN 10	0	0	0	0	0
PIN 11	11.7	11.7	11.7	11.8	11.8
PIN 12	0.1	0.1	0.1	0.1	0.1
PIN 13	11.9	11.9	11.9	11.9	11.9
PIN 14	11.8	11.8	11.8	11.8	11.8
PIN 15	0	0	0	0	0
PIN 16	11.9	11.9	11.9	11.9	11.9

	STOP			REC			PLAY			CUE(×9)			REV		
	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C
Q3001	1.7	2.3	1.7	1.7	2.3	1.7	1.6	2.3	1.7	1.6	2.3	1.7	1.6	2.3	1.7
Q3002	2.7	9.8	1.7	2.7	9.8	1.7	2.7	9.8	1.6	2.7	9.8	1.6	2.7	9.7	1.6
Q3003	0	0.7	0	0	0.7	0	0	0.7	0	0	0.7	0	0	0.7	0
Q3004	2.3	1.7	0	2.3	1.7	0	2.3	1.6	0	2.3	1.6	0	2.3	1.7	0
Q3005	2.6	2.0	0	2.6	2.0	0	2.6	2.0	0	2.6	2.0	0	2.6	2.0	0
Q3006	1.9	1.3	1.9	1.9	1.3	1.9	1.9	1.2	1.9	1.9	1.3	1.9	1.9	1.3	1.9
Q3007	2.6	3.3	3.9	0	0	0	2.6	3.3	3.9	2.6	3.3	3.9	2.6	3.3	3.9
Q3008	0.8	1.6	3.3	0	0	0	0.8	1.6	3.3	0.8	1.6	3.3	0.8	1.6	3.3
Q3009	0	0.1	0	0	0.1	0	0	0.1	0	0	0.1	0	0	0.1	0
Q3010	3.2	2.6	0	3.2	2.6	0	3.3	2.6	0	3.3	2.6	0	3.3	2.6	0
Q3011	0.2	0.9	0.2	0.2	0.9	0.2	0.2	0.9	0.2	0.2	0.9	0.2	0.2	0.9	0.2
Q3012	0	0.1	0	0	0.1	0	0	0.1	0	0	0.1	0	0	0.1	0
Q3013	0	0	0	0	0.6	0	0	0	0	0	0	0	0	0	0
Q3014	0	0.7	0	0	0.1	5.3	0	0.7	0	0	0.7	0	0	0	0
Q3015	0	0.7	0	0	0.1	0	0	0.7	0	0	0.7	0	0	0.7	0
Q3016	0	0	11.9	0	0	11.9	0	0	11.9	0	0	0	0	0	11.9
Q3017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Q3018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Q3019	0	0	0	0	0.7	0	0	0	0	0	0	0	0	0	0
Q3020	0	0	0	0	0.7	0	0	0	0	0	0	0	0	0	0
Q3021	2.9	3.6	4.9	0	0	0	2.9	3.6	4.9	2.9	3.6	4.9	2.9	3.6	4.9
Q3022	0	0.8	0	0	0	0	0	0.8	0	0	0.8	0	0	0.8	0
Q3023	0.6	1.3	4.0	0	0	0	0.6	1.3	3.9	0.6	1.3	3.9	0.6	1.3	3.9
Q3024	1.3	2.1	3.2	0	0	0	1.3	2.1	3.2	1.4	2.1	3.2	1.3	2.1	3.2
Q3025	0	0	4.5	0	0	0	0	0	4.5	0	0.3	0.1	0	0.3	0.1
Q3026	0.8	1.5	0.8	0	0	6.7	5.2	4.5	5.9	5.2	4.5	5.8	5.2	4.5	5.9
Q3027	0	0	2.7	0	0	2.5	0	0	2.8	0	0.1	2.6	0	0.1	2.6
Q3028	12.0	11.9	0	11.9	11.2	11.9	11.9	11.9	0	12.0	12.0	0	11.9	11.9	0
Q3029	3.8	4.5	11.9	3.8	4.5	11.9	3.8	4.5	11.9	3.8	4.5	11.9	3.8	4.5	11.9
Q3030	0	0	0	0	0.6	0	0	0	0	0	0.6	0	0	0.6	0
Q3031	0	0	0.1	0	0	0.1	0	0	0.1	0.3	0	0.1	0.3	0	0.1
Q3032	0	0.7	0.1	0	0.7	0.1	0	0.7	0.1	0	0.7	0.1	0	0.7	0.1
Q3033	0	0.1	11.4	0	0	11.4	0	0.1	11.4	0	0.1	11.4	0	0.1	11.4

PIN NO.	IC4001		
	STOP	REC	PLAY
PIN 1	5.1	5.3	5.2
PIN 2	5.3	5.4	5.3
PIN 3	5.3	5.5	5.5
PIN 4	5.6	5.8	5.6
PIN 5	5.7	5.8	5.6
PIN 6	5.7	5.8	5.6
PIN 7	5.6	5.8	5.6
PIN 8	5.6	5.8	5.6
PIN 9	5.6	5.8	5.6
PIN 10	0	0	0
PIN 11	0.3	0.3	0
PIN 12	10.6	10.9	10.6
PIN 13	5.6	5.7	5.6
PIN 14	5.6	5.8	5.6
PIN 15	5.6	5.8	5.6
PIN 16	5.6	5.8	5.6
PIN 17	0.2	0.2	0.2
PIN 18	4.3	4.2	0
PIN 19	5.6	5.7	5.6
PIN 20	5.5	5.6	5.5
PIN 21	5.5	5.6	5.5
PIN 22	5.4	5.5	5.4

TP NO.	STOP	REC	PLAY
TP4002	0	0	0
TP4001	0	0	0

PIN NO.	IC3003				
	STOP	REC	PLAY	CUE(×9)	REV
PIN 1	3.7	0	3.7	3.7	3.7
PIN 2	1.2	0	1.2	1.2	1.2
PIN 3	0	0	0	0	0
PIN 4	3.6	0	3.6	3.6	3.6
PIN 5	1.8	0	1.9	1.9	1.9
PIN 6	1.8	0	1.9	1.9	1.9
PIN 7	4.6	0	4.7	4.6	4.6
PIN 8	3.0	0	3.1	3.0	3.0
PIN 9	3.0	0	3.1	3.0	3.0
PIN 10	1.1	0	1.2	1.2	1.2
PIN 11	1.5	0	4.5	4.5	4.5
PIN 12	1.6	0	1.6	1.6	1.6
PIN 13	2.5	0	2.5	2.5	2.5
PIN 14	2.5	0	2.5	2.5	2.5
PIN 15	2.7	0	2.6	2.6	2.6
PIN 16	2.5	0	2.5	2.5	2.5
PIN 17	3.2	0	3.2	3.1	3.1
PIN 18	3.1	0	3.1	3.1	3.1

PIN NO.	IC3004				
	STOP	REC	PLAY	CUE(×9)	REV
PIN 1	0	0	0	0	0
PIN 2	0	1.1	0	0	0
PIN 3	0	10.7	0	0	0
PIN 4	11.4	11.4	11.4	11.4	11.4
PIN 5	0.1	0.1	0.1	0.1	0.1
PIN 6	0	11.8	0	0	0
PIN 7	6.6	6.6	6.6	6.0	6.6
PIN 8	★	★	★	★	★
PIN 9	0	11.8	0	0	0
PIN 10	0	7.5	0	0	0
PIN 11	0	10.7	0	0	0
PIN 12	★	★	★	★	★
PIN 13	★	★	★	★	★
PIN 14	0	5.3	0	0	0
PIN 15	0	0	0	0	0
PIN 16	0	0	0	0	0
PIN 17	★	★	★	★	★
PIN 18	★	★	★	★	★
PIN 19	0	0	0	0	0
PIN 20	0	4.5	0	0	0

PIN NO.	IC3303				
	STOP	REC	PLAY	CUE(×9)	REV
PIN 1	11.1	11.1	11.1	11.1	11.2
PIN 2	0	0	0	0	0
PIN 3	0.1	0.1	0.1	0.1	0
PIN 4	11.1	11.1	11.1	11.1	11.1
PIN 5	0	0	0	0	0
PIN 6	★	★	★	★	★
PIN 7	0	0	0	0.2	0.2
PIN 8	0	0	0	0	0
PIN 9	0	0	0	0	0
PIN 10	0	0	0	0	0
PIN 11	0	0	0	0	0
PIN 12	0	0	0	0	0
PIN 13	★	★	★	★	★
PIN 14	0	0	0	0.2	-0.2
PIN 15	9.9	9.9	9.9	9.9	9.9
PIN 16	2.9	2.9	2.9	2.9	2.9
PIN 17	★	★	★	★	★
PIN 18	0	0	0	0	0
PIN 19	0	0	0	0	0
PIN 20	9.9	9.9	9.9	9.9	9.9
PIN 21	3.2	2.9	3.2	3.3	3.3
PIN 22	11.9	11.9	11.9	11.9	11.9

	STOP			REC			PLAY			CUE(x9)			REV		
	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C
Q3034	0	0	4.2	0	0	4.2	0	0	4.2	0	0.6	0.1	0	0.6	0.1
Q3035	11.9	11.9	0	11.9	11.2	11.9	11.9	11.9	0.1	12.0	11.9	0.1	11.9	11.9	0.1
Q3036	0	0	11.9	0	0.7	0	0	0	11.9	0	0	11.9	0	0	11.9
Q3037	5.0	4.3	4.9	5.0	5.0	0	5.0	4.3	4.9	5.0	4.3	4.9	5.0	4.3	4.9
Q3038	0	0.7	0	0	0	5.0	0	0.7	0	0	0.7	0	0	0.9	0
Q3039	0	0	0.7	0	0.6	0	0	0	0.7	0	0	0.7	0	0	0.7
Q3040	0	0.1	11.9	0	0.7	0.1	0	0.1	11.9	0	0.1	12.0	0	0.1	—11.9
Q3041	0	0.6	0	0	0.6	0	0	0.6	0	0	0	0.1	0	0	0.1
Q3042	2.2	2.9	2.2	2.2	2.9	2.3	2.1	2.8	2.2	2.1	2.8	2.2	2.2	2.8	2.2
Q3043	8.4	7.8	2.2	8.4	7.8	2.2	8.4	7.8	2.1	8.3	7.7	2.1	8.3	7.7	2.2
Q3044	0	0.7	0	0	0	0	0	0.7	0	0	0	0	0	0.8	0
Q3045	0	0.1	10.5	0	0.1	10.5	0	0.1	10.5	0	0.1	10.6	0	0.1	10.5
Q3046	0	0.6	0	0	0.6	0	0	0.6	0.1	0	0.1	0	0	0.1	0
Q3047	0	0.6	0	0	0.6	0.2	0	0.6	0	0	0.1	★	0	0.1	★
Q3048	0	0	★	0	0	★	0	0	★	0	0.5	0	0	0.5	0
Q3049	0	0	0.6	0	0	0.6	0	0	0.6	0	0.1	0	0	0.1	0
Q3051	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Q3301	4.4	4.7	11.9	4.4	4.7	11.9	4.4	4.7	11.9	4.4	4.7	11.9	4.4	4.7	11.9
Q3302	0.6	0.9	11.9	0.6	0.9	11.9	0.6	0.9	11.9	0.6	0.9	11.9	0.6	0.9	11.9
Q3303	6.9	7.7	11.8	6.9	7.7	11.8	7.0	7.7	11.8	6.9	7.7	11.8	6.9	7.7	11.8
Q3304	0.8	1.5	6.6	0.8	1.5	6.6	0.8	1.5	6.6	0.8	1.5	6.7	0.8	1.5	6.7
Q3305	9.1	9.8	11.8	9.1	9.8	11.8	9.1	9.8	11.8	9.1	9.8	11.8	9.1	9.8	11.8
Q3306	3.3	3.9	11.8	3.2	3.9	11.8	3.3	3.9	11.8	3.3	4.0	11.8	3.3	4.0	11.8
Q3307	0.1	0.7	4.6	0.1	0.7	4.6	0.1	0.7	4.6	0.1	0.7	4.7	0.1	0.7	4.7
Q3308	4.0	4.6	11.8	4.0	4.6	11.8	4.0	4.6	11.8	4.1	4.7	11.8	4.0	4.7	11.8
Q3309	0	0.2	11.9	0	0.2	11.9	0	0.2	11.8	0	0.2	11.9	0	0.2	11.9
Q3311	0	0.1	6.8	0	0.1	6.8	0	0.1	6.8	0	0.1	6.8	0	0.1	6.8
Q3312	0	0.7	0	0	0.7	0	0	0.7	0	0	0.7	0	0	0.7	0

[illegible]

	STOP			REC			PLAY		
	E	B	C	E	B	C	E	B	C
Q4001	0	0.7	0	—3.8	—12.5	—3.8	0	0.7	0
Q4002	0	0.8	0	—3.8	—12.5	0	0	0.8	0
Q4003	10.6	9.9	10.4	10.9	10.9	—12.5	10.6	9.9	10.4
Q4004	0	0.6	0	0	0	10.8	0	0.6	0
Q4005	0	0.6	0	0	0.6	0	0	0	0
Q4006	0	0	0.6	0	0	0	0	0	0.6
Q4007	0	0	0	0	0	0	0	0	0
Q4008	0	0.1	0	0	0	0	0	0.1	0
Q4009	0	0.1	0	0	0	0	0	0.1	0
Q4010	0	0	0	0	0	0	0	0	0
Q4011	0	0	★	0	0	★	0	0	★
Q4012	10.7	11.4	11.9	10.9	11.6	11.9	10.6	11.4	11.9
Q4023	0	0.1	11.5	0	0	0	0	0.1	11.5
Q4024	0	0	14.5	0	0.7	0	0	0	11.5
Q4025	11.5	11.9	11.9	0.1	0	11.9	11.5	11.9	11.9
Q4026	11.5	11.9	11.9	0.1	—0.1	0.4	11.5	11.9	0
Q4029	1.8	2.5	3.4	1.9	2.5	3.5	1.8	2.5	3.4

TP NO.	STOP	REC	PLAY	CUE(×9)	REV
TP3001	0	0	0	0	0
TP3002	2.6	2.6	2.4	2.4	2.4
TP3003	3.4	3.4	3.8	3.8	3.8
TP3004	3.4	3.4	3.8	3.8	3.8
TP3005	4.9	0	4.9	4.9	4.9
TP3006	0	0	0	0	0
TP3007	0	0	0	0	0
TP3008	0	5.3	0	0	0
TP3009	0	0	0	0	0
TP3010	0	0	0	0	0
TP3011	0	0	0	0	0
TP3012	0	0	0	0	0
TP3013	0	0	0	0	0
TP3014	0	0	0	0	0
TP3015	0	0	0	0	0
TP3016	3.1	0	3.2	3.2	3.2
TP3017	3.1	0	3.2	3.2	3.2
TP3018	9.1	9.1	9.1	9.1	9.1
TP3019	2.5	0	2.5	2.5	2.5
TP3021	2.9	2.9	2.9	2.9	2.9
TP30303	10.3	10.2	10.3	10.2	10.3
TP30304	11.1	11.1	11.1	11.1	11.1

LUMINANCE & AUDIO [I] C.B.A.	
Q3001	3-B
Q3002	3-A
Q3003	3-A
Q3004	3-A
Q3005	4-A
Q3006	4-A

2	REC
3	E-E
4	VIDEO MUTE
5	AUDIO MUTE
6	AUDIO DUB
7	DELAY AUDIO DUB
8	GND

1	SP L CH VIDEO HEAD
2	SP L CH VIDEO HEAD
3	GND
4	GND
5	LP/SLP L CH VIDEO HEAD
6	LP/SLP L CH VIDEO HEAD
7	SP R CH VIDEO HEAD
8	SP R CH VIDEO HEAD
9	GND
10	GND
11	LP/SLP R CH VIDEO HEAD
12	LP/SLP R CH VIDEO HEAD

1	
2	
3	CAMERA

1	VIDEO
2	GND
3	TUNER
4	AUDIO
5	GND

1	AUDIO L CH
2	GND
3	AUDIO R CH
4	GND
5	AUDIO L CH
6	GND
7	AUDIO R CH
8	GND
9	VIDEO
10	GND

1	AUDIO HEAD L CH (R)
2	GND
3	AUDIO HEAD L CH (W)

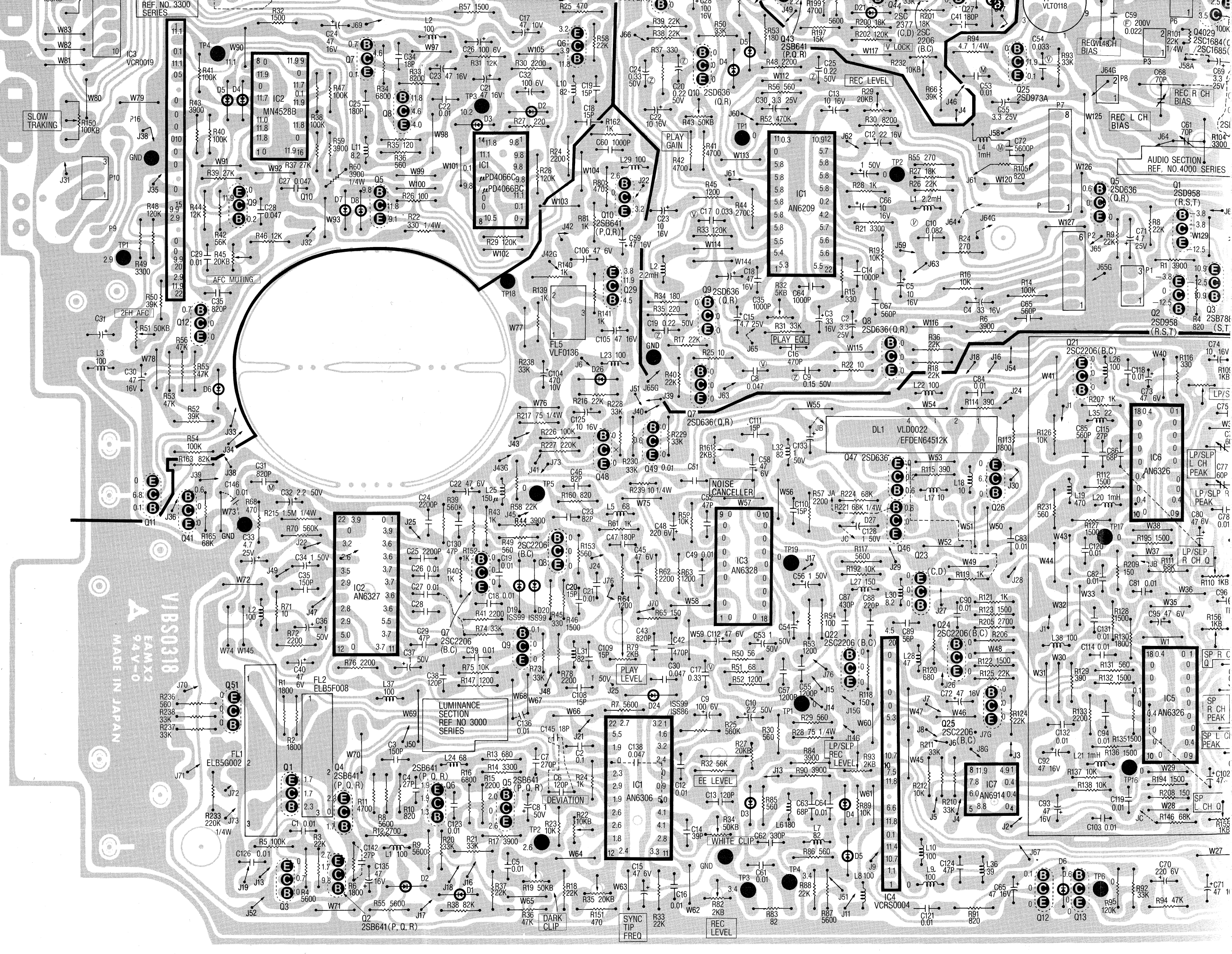
1	MIC L CH
2	GND
3	MIC L CH
4	GND
5	LINE L CH
6	GND

1	FULL ERASE HEAD
2	GND

1	AUDIO ERASE HEAD
2	GND

1	LP/SLP
2	SLP
3	EXCEPT REC
4	AUDIO MUTE
5	GND
6	LINE

1	GND
2	GND
3	
4	GND
5	REG +12V



E

D

C

B

A

1

2

3

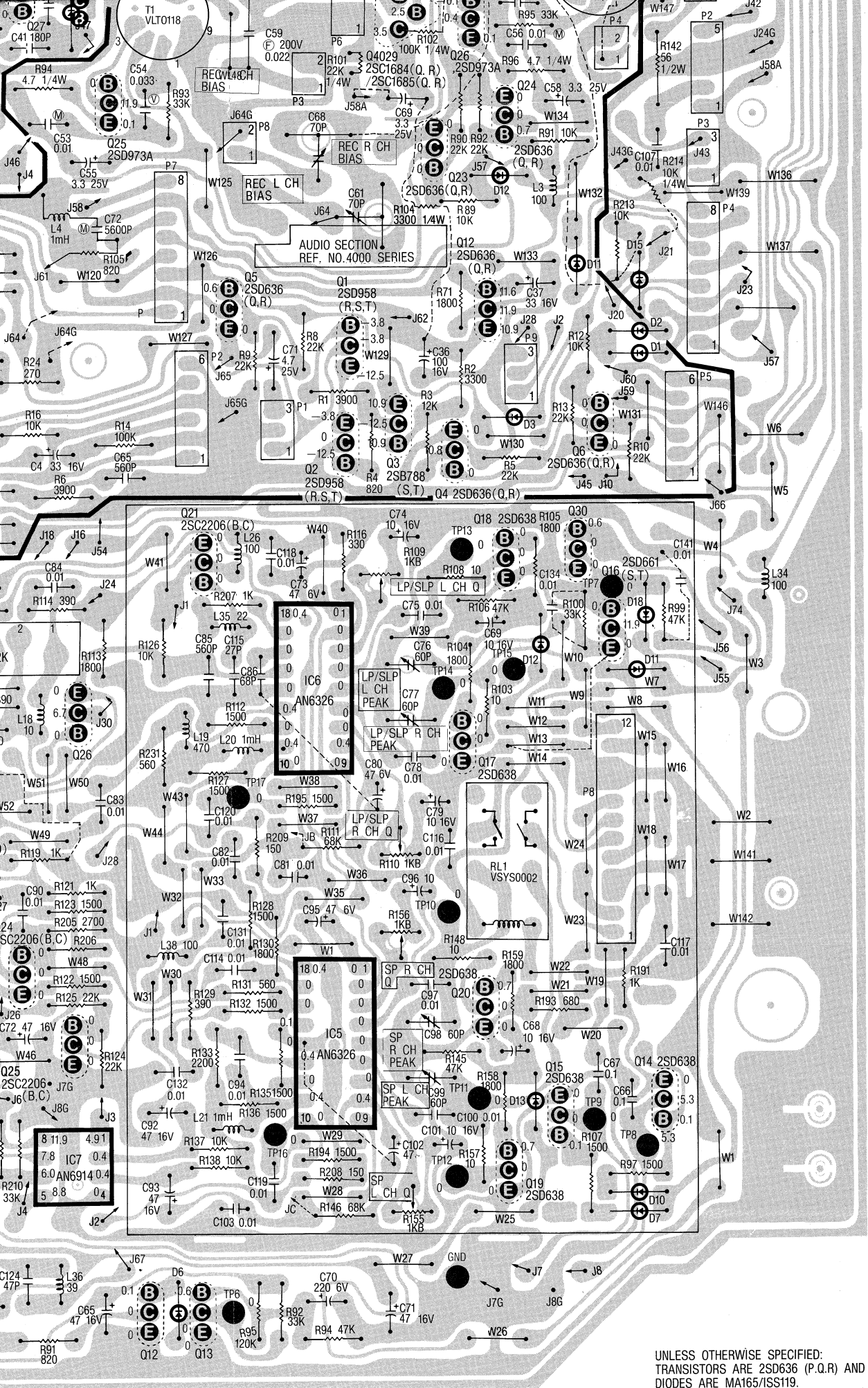
4

5

6

7

8



UNLESS OTHERWISE SPECIFIED:
TRANSISTORS ARE 2SD636 (P.Q.R) AND
DIODES ARE MA165/ISS119.

P4007

1	REC
2	GND
3	REC (H) / A-DUB (H) / EE (H)
4	DOLBY
5	REG +12V
6	DOLBY
7	GND
8	AUDIO

P4008

1	REC BIAS
2	GND

P4009

1	ENVELOPE (1)
2	ENVELOPE (2)
3	GND

JA

1	TRACKING
2	TRACKING
3	SLOW TRACKING
4	SLOW TRACKING
5	

JB

1	SYNC FRONT PULSE
2	VIDEO (FOR HSS)
3	HSS
4	DOC
5	VIDEO
6	GND

JC

1	RF
2	EE (H)
3	ACK
4	AFC
5	PLAY CHROMA
6	REC CHROMA
7	REC +12V
8	LP CUE/REVIEW (H)

JD

1	CUE/REVIEW (H)
2	LP/SLP (H)
3	STILL (H)
4	REG +5V
5	LP/SLP (H)
6	V CORRECTION
7	PG 30Hz
8	REC +5V

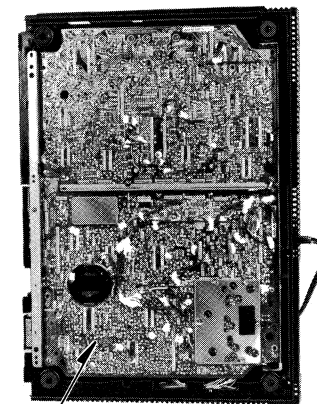
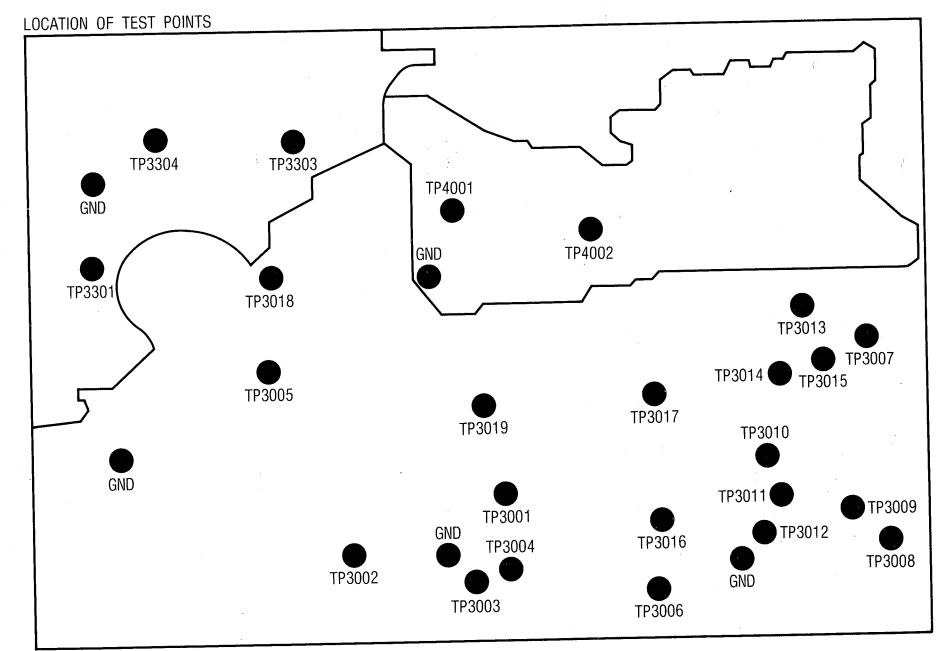
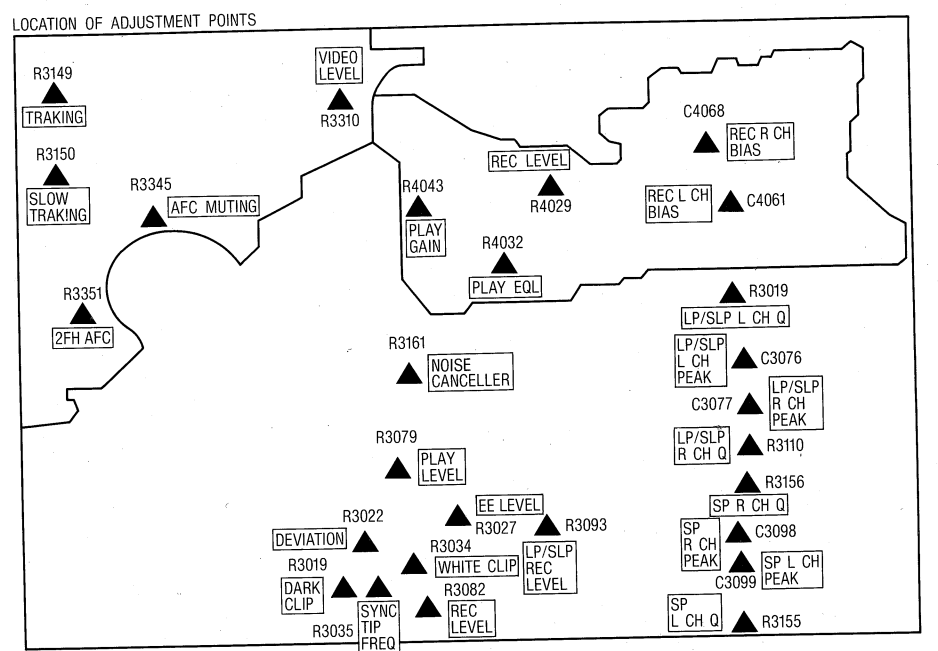
JE

1	ARTIFICIAL V SYNC
2	LP (H)
3	GND
4	SLOW/STILL (L)
5	SLP (H)
6	DELAY REC (H)

JF

1	X2 SPEED (H)
2	ENVELOPE DETECT
3	HEAD AMP SELECT

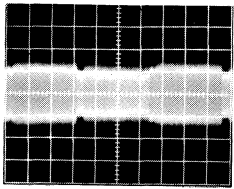
LUMINANCE & AUDIO (I) C.B.A.	
Q3001	3-B
Q3002	3-A
Q3003	3-A
Q3004	3-A
Q3005	4-A
Q3006	4-A
Q3007	4-C
Q3008	5-C
Q3009	4-B
Q3010	5-E
Q3011	6-F
Q3012	7-A
Q3013	7-A
Q3014	9-B
Q3015	9-B
Q3016	9-D
Q3017	8-C
Q3018	8-D
Q3019	8-B
Q3020	8-B
Q3021	7-D
Q3022	6-B
Q3023	6-C
Q3024	7-B
Q3025	7-B
Q3026	7-C
Q3027	7-F
Q3028	9-F
Q3029	5-D
Q3030	9-D
Q3031	7-F
Q3032	7-F
Q3033	7-F
Q3034	7-F
Q3035	8-F
Q3036	7-F
Q3037	9-F
Q3038	8-F
Q3039	8-F
Q3040	9-F
Q3041	3-C
Q3042	6-F
Q3043	6-F
Q3044	6-F
Q3045	6-F
Q3046	6-C
Q3047	6-C
Q3048	5-C
Q3049	5-C
Q3051	3-B
Q3301	3-F
Q3302	4-F
Q3303	3-F
Q3304	4-F
Q3305	4-E
Q3306	5-E
Q3307	3-E
Q3308	4-E
Q3309	3-E
Q3311	2-C
Q3312	3-D
Q4001	8-E
Q4002	8-D
Q4003	8-D
Q4004	8-D
Q4005	8-E
Q4006	9-D
Q4007	5-D
Q4008	6-D
Q4009	5-D
Q4010	5-E
Q4011	5-F
Q4012	8-E
Q4023	8-E
Q4024	8-E
Q4025	7-E
Q4026	8-F
Q4029	8-F



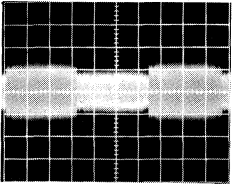
LUMINANCE & AUDIO (I) C.B.A.

AUDIO [II] & DOLBY SCHEMATIC DIAGRAM

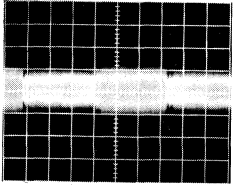
NOTE : REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
EXAMPLE : C.B.A.R2, REF. NO. 4400
SERIES SCHEMATIC DIAGRAM.....
4402 (4402 IS ABBREVIATED
TO R2)



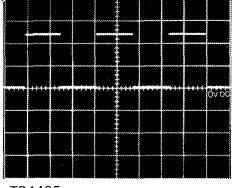
TP4403 P.B/SP.
0.1V/5msec. div.



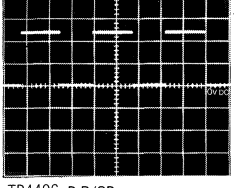
TP4404 P.B/LP.
0.1V/5msec. div.



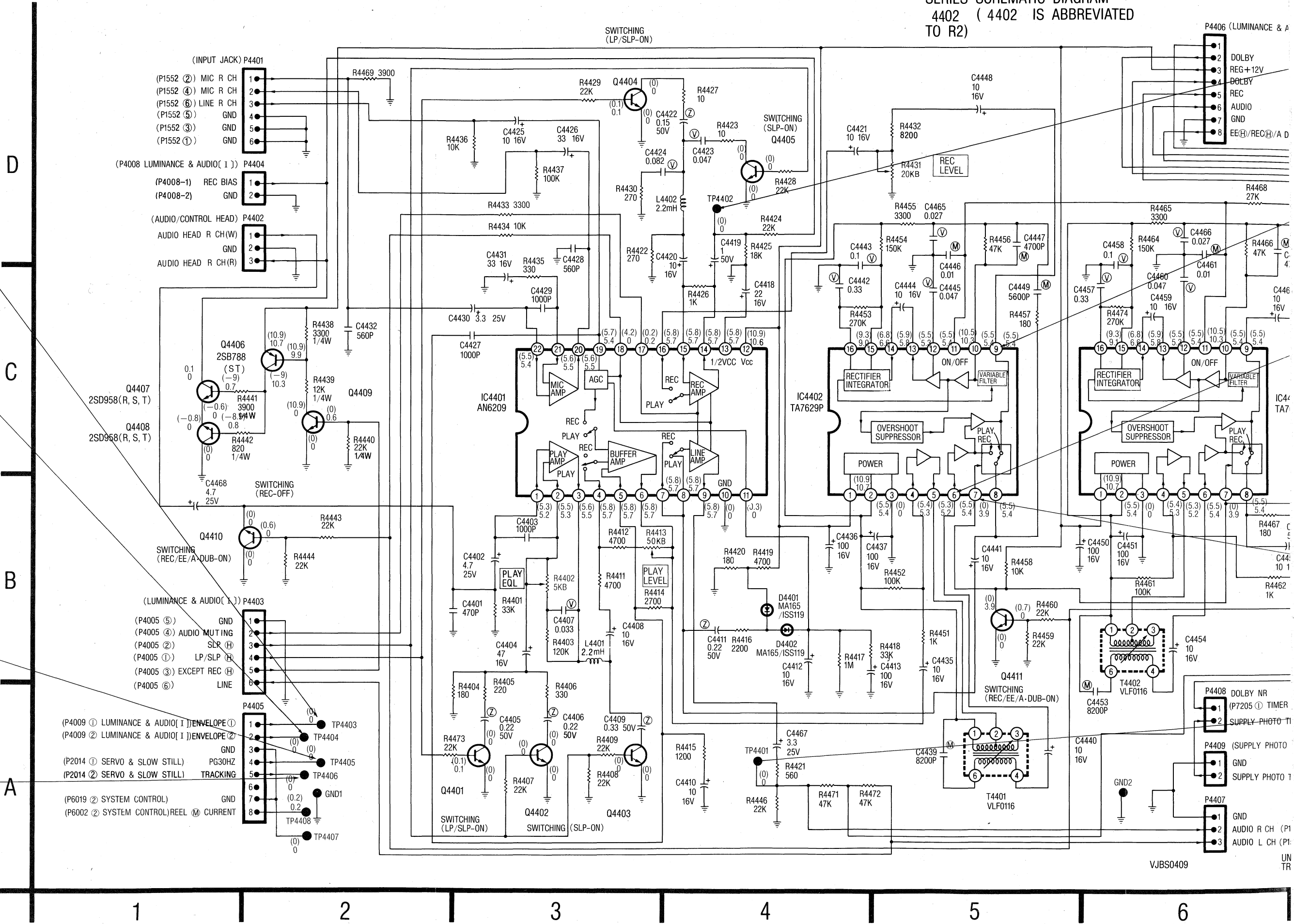
TP4405 P.B/SLP.
0.1V/5msec. div.



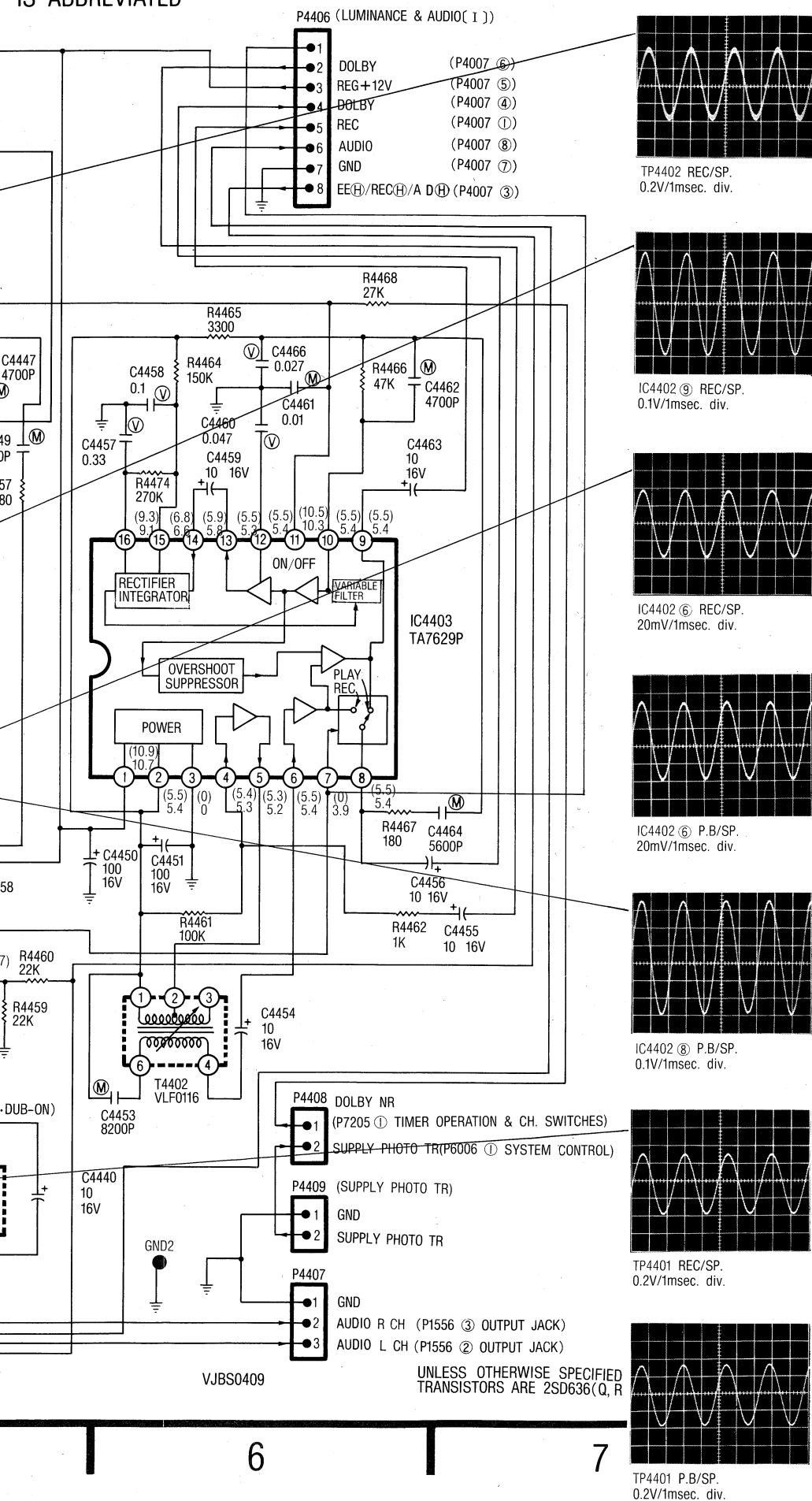
TP4406 P.B/SP.
2V/10msec. div.



TP4407 P.B/SP.
2V/10msec. div.



NTED AS FOLLOWS.
REF. NO. 4400
ATIC DIAGRAM.....
IS ABBREVIATED




VOLTAGE MEASUREMENT :
 COLOR BAR SIGNAL IN SP REC MODE WITH IN
 BRACKET.
 COLOR BAR SIGNAL IN SP PLAY MODE WITH OUT
 BRACKET.
 DOLBY SWITCH (SW 6301) IS OFF.

P4401 (AUDIO [II] & DOLBY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	MIC R CH	P1552-2 INPUT JACK C.B.A.
2	MIC R CH	P1552-4 INPUT JACK C.B.A.
3	LINE R CH	P1552-6 INPUT JACK C.B.A.
4	GND	P1552-5 INPUT JACK C.B.A.
5	GND	P1552-3 INPUT JACK C.B.A.
6	GND	P1552-1 INPUT JACK C.B.A.

P4402 (AUDIO [II] & DOLBY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	AUDIO HEAD RCH (W)	AUDIO/CONTROL HEAD
2	GND	AUDIO/CONTROL HEAD
3	AUDIO HEAD R CH (R)	AUDIO/CONTROL HEAD

P4403 (AUDIO [II] DOLBY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P4005-5 LUMINANCE & AUDIO [I] C.B.A.
2	AUDIO MUTING	P4005-4 LUMINANCE & AUDIO [I] C.B.A.
3	SLP (H)	P4005-2 LUMINANCE & AUDIO [I] C.B.A.
4	LP/SLP (H)	P4005-1 LUMINANCE & AUDIO [I] C.B.A.
5	EXCEPT REC (H)	P4005-3 LUMINANCE & AUDIO [I] C.B.A.
6	LINE	P4005-6 LUMINANCE & AUDIO [I] C.B.A.

P4404 (AUDIO [I] & DOLBY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	REC BIAS	P4008-1 LUMINANCE & AUDIO [I] C.B.A.
2	GND	P4008-2 LUMINANCE & AUDIO [I] C.B.A.

P4405 (AUDIO [I] & DOLBY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	ENVELOPE ①	P4009-1 LUMINANCE & AUDIO [I] C.B.A.
2	ENVELOPE ②	P4009-2 LUMINANCE & AUDIO [I] C.B.A.
3	GND	
4	PG 30Hz	P2014-1 SERVO. SLOW. STILL & CHROMINANCE C.B.A.
5	TRACKING	P2014-2 SERVO. SLOW. STILL & CHROMINANCE C.B.A.
6		
7	GND	P6019-2 SYSTEM CONTROL C.B.A.
8	REEL  CURRENT	P6002-2 SYSTEM CONTROL C.B.A.

P4406 (AUDIO [I] & DOLBY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1		
2	DOLBY	P4007-6 LUMINANCE & AUDIO [I] C.B.A.
3	REG+12V	P4007-5 LUMINANCE & AUDIO [I] C.B.A.
4	DOLBY	P4007-4 LUMINANCE & AUDIO [I] C.B.A.
5	REC	P4007-1 LUMINANCE & AUDIO [I] C.B.A.
6	AUDIO	P4007-8 LUMINANCE & AUDIO [I] C.B.A.
7	GND	P4007-7 LUMINANCE & AUDIO [I] C.B.A.
8	EE/REC/A·D (H)	P4007-3 LUMINANCE & AUDIO [I] C.B.A.

P4007 (AUDIO [II] & DOLBY C.B.A.)			
PIN NO.	SIGNAL NAME	DESTINATION	
1	GND		
2	AUDIO R CH	P1556-3	REAR JACK
3	AUDIO L CH	P1556-2	REAR JACK

P4408 (AUDIO [II] & DOLBY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	DOLBY NR (H)	P7205-1 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
2	SUPPLY PHOTO TR	P6006-1 SYSTEM CONTROL C.B.A.

P4409 (AUDIO [II] & DOLBY C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	SUPPLY PHOTO TR C.B.A
2	SUPPLY PHOTO TR	SUPPLY PHOTO TR C.B.A

AUDIO [II] & DOLBY C.B.A. VEPS0409A

VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL IN
SP REC MODE.
DOLBY SWITCH (SW 6301) IS OFF.

P4401

1	MIC R CH
2	MIC R CH
3	LINE R CH
4	GND
5	GND
6	GND

P4402

1	AUDIO HEAD R CH(W)
2	GND
3	AUDIO HEAD R CH(R)

P4403

1	GND
2	AUDIO MUTING
3	SLP ⊕
4	LP/SLP ⊕
5	EXCEPT REC ⊕
6	LINE

P4404

1	REC BIAS
2	GND

P4405

1	ENVELOPE ①
2	ENVELOPE ②
3	GND
4	PG 30Hz
5	TRACKING
6	
7	GND
8	REEL ⊗ CURRENT

P4407

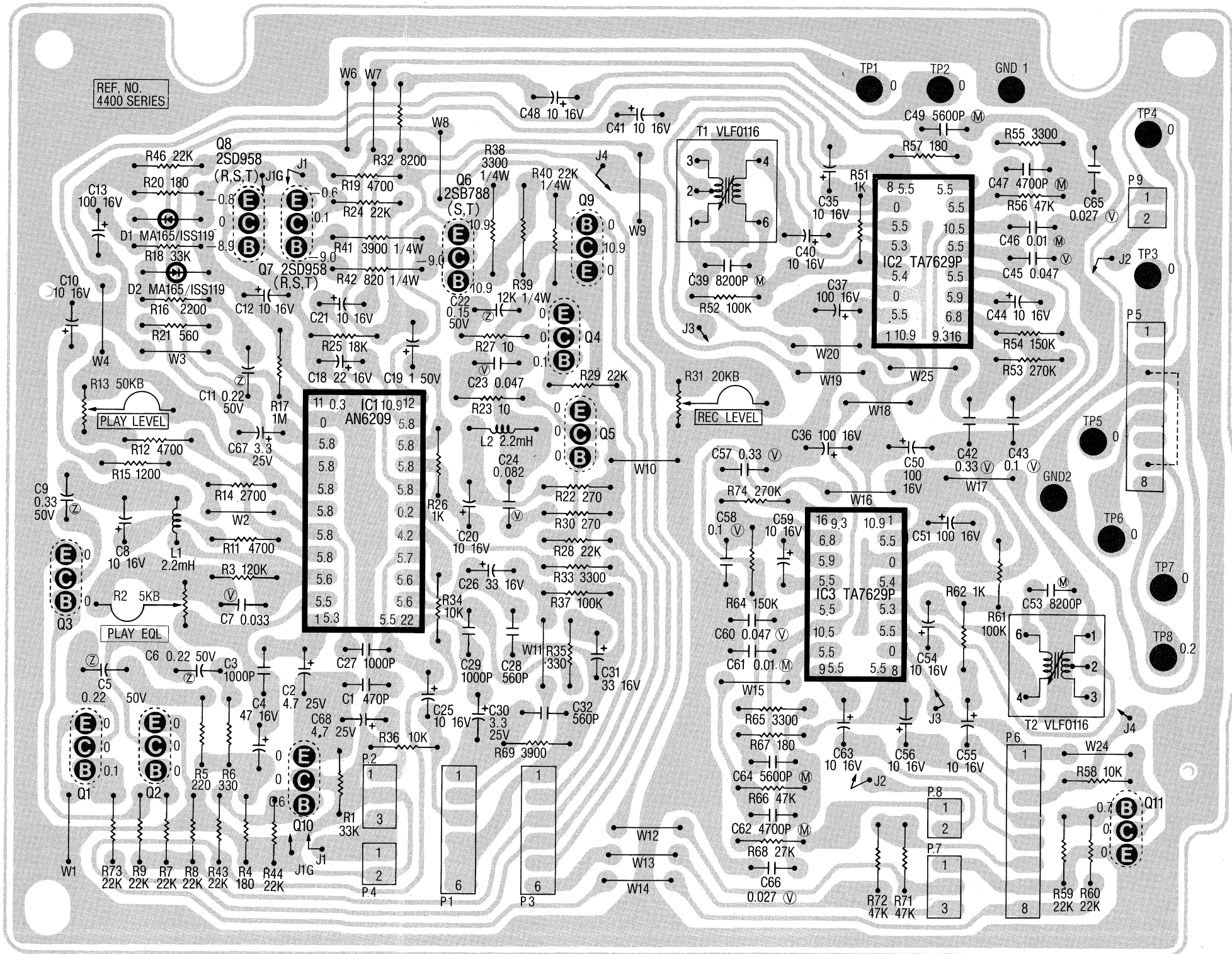
1	GND
2	AUDIO R CH
3	AUDIO L CH

P4408

1	DOLBY SW
2	SUPPLY PHOTO TR

P4409

1	GND
2	SUPPLY PHOTO TR



AUDIO [II]

Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11

P4006

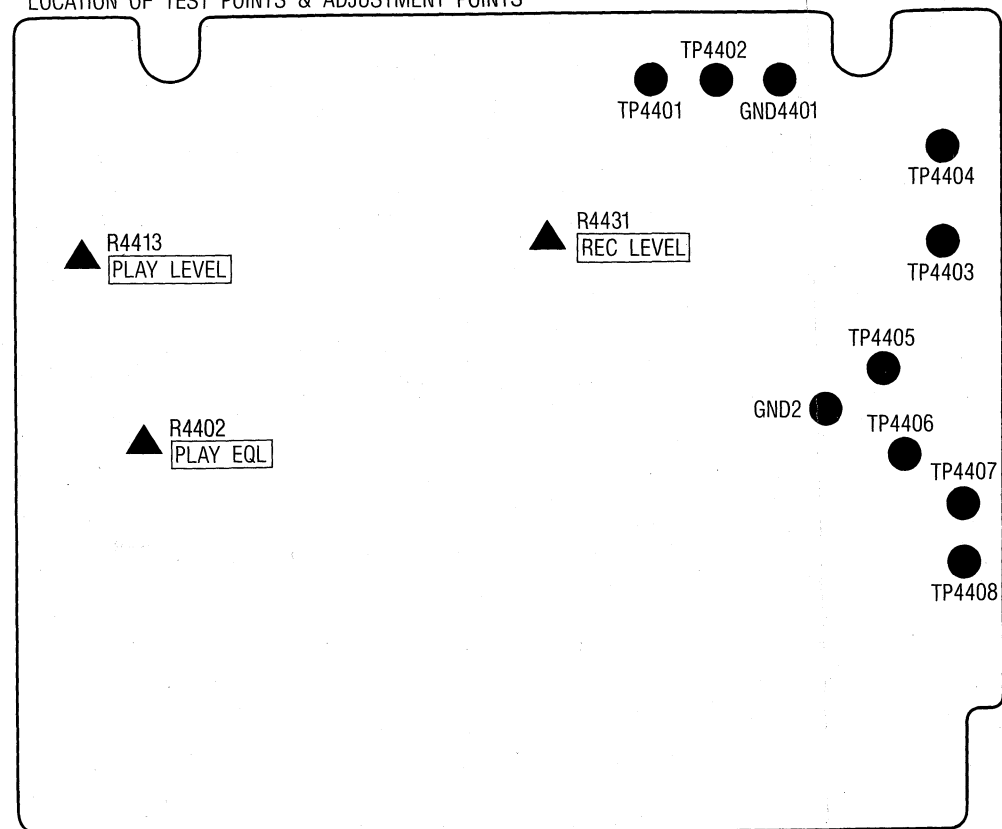
1	
2	DOLBY
3	REG +12V
4	DOLBY
5	REC
6	AUDIO
7	GND
8	EE ⊕ / REC ⊕ / A D ⊕

VJBS0409 UNLESS OTHERWISE SPECIFIED:
TRANSISTORS ARE 2SD636(Q.R).

AR SIGNAL IN
MODE.
6301) IS OFF.

AUDIO(II) & DOLBY C.B.A.	
Q1	2-A
Q2	2-A
Q3	2-B
Q4	3-C
Q5	3-B
Q6	3-C
Q7	2-C
Q8	2-C
Q9	3-C
Q10	3-A
Q11	5-A

LOCATION OF TEST POINTS & ADJUSTMENT POINTS



★ : UNMEASURABLE OR UNNECESSARY TO MEASURE.

VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL IN
SP MODE.

DOLBY SWITCH (SW 6301) IS OFF.

PIN NO.	IC4401		
	STOP	REC	PLAY
PIN 1	5.2	5.3	5.2
PIN 2	5.3	5.5	5.3
PIN 3	5.5	5.6	5.5
PIN 4	5.7	5.8	5.7
PIN 5	5.7	5.8	5.7
PIN 6	5.7	5.8	5.7
PIN 7	5.7	5.8	5.7
PIN 8	5.7	5.8	5.7
PIN 9	5.7	5.8	5.7
PIN 10	0	0	0
PIN 11	0.3	0.3	0
PIN 12	10.7	10.9	10.6
PIN 13	5.6	5.8	5.7
PIN 14	5.7	5.8	5.7
PIN 15	5.7	5.8	5.7
PIN 16	5.7	5.8	5.7
PIN 17	0.2	0.2	0.2
PIN 18	4.3	4.2	0
PIN 19	5.6	5.7	5.4
PIN 20	5.5	5.6	5.5
PIN 21	5.5	5.6	5.5
PIN 22	5.4	5.5	5.4

PIN NO.	IC4402		
	STOP	REC	PLAY
PIN 1	10.7	10.9	10.7
PIN 2	5.4	5.5	5.4
PIN 3	0	0	0
PIN 4	5.3	5.4	5.3
PIN 5	5.2	5.3	5.2
PIN 6	5.4	5.5	5.4
PIN 7	0	0	3.9
PIN 8	5.4	5.5	5.4
PIN 9	5.4	5.5	5.4
PIN 10	5.4	5.5	5.4
PIN 11	10.3	10.5	10.3
PIN 12	5.4	5.5	5.4
PIN 13	5.3	5.5	5.3
PIN 14	5.8	5.9	5.8
PIN 15	6.6	6.8	6.6
PIN 16	9.0	9.3	9.0

PIN NO.	IC4403		
	STOP	REC	PLAY
PIN 1	10.7	10.9	10.7
PIN 2	5.4	5.5	5.4
PIN 3	0	0	0
PIN 4	5.3	5.4	5.3
PIN 5	5.4	5.3	5.2
PIN 6	5.4	5.5	5.4
PIN 7	0	0	3.9
PIN 8	5.4	5.5	5.4
PIN 9	5.4	5.5	5.4
PIN 10	5.4	5.5	5.4
PIN 11	10.3	10.5	10.3
PIN 12	5.4	5.5	5.4
PIN 13	5.3	5.5	5.3
PIN 14	5.8	5.9	5.8
PIN 15	6.6	6.8	6.6
PIN 16	9.1	9.3	9.1

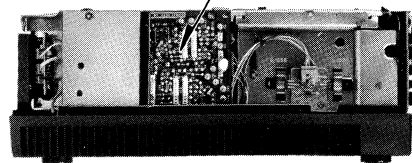
	STOP			REC			PLAY		
	E	B	C	E	B	C	E	B	C
Q4401	0	0.1	0	0	0.1	0	0	0.1	0
Q4402	0	0	0	0	0	0	0	0	0
Q4403	0	0	★	0	0	★	0	0	★
Q4404	0	0.1	0	0	0.1	0	0	0.1	0
Q4405	0	0	0	0	0	0	0	0	0
Q4406	10.7	9.9	10.3	10.9	10.9	-9.0	10.7	9.9	10.3
Q4407	0	0.7	0	-0.6	-9.0	0.1	0	0.7	0
Q4408	0	0.8	0	-0.8	-8.9	0	0	0.8	0
Q4409	0	0.6	0	0	0	10.9	0	0.6	0
Q4410	0	0.6	0	0	0.6	0	0	0	0
Q4411	0	0.7	0	0	0.7	0	0	0	3.9

TP NO.	STOP	REC	PLAY
TP4401	0	0	0
TP4402	0	0	0
TP4403	0	0	0
TP4404	0	0	0
TP4405	0	0	0
TP4406	0	0	0
TP4407	0	0	0
TP4408	0	0.2	0.2

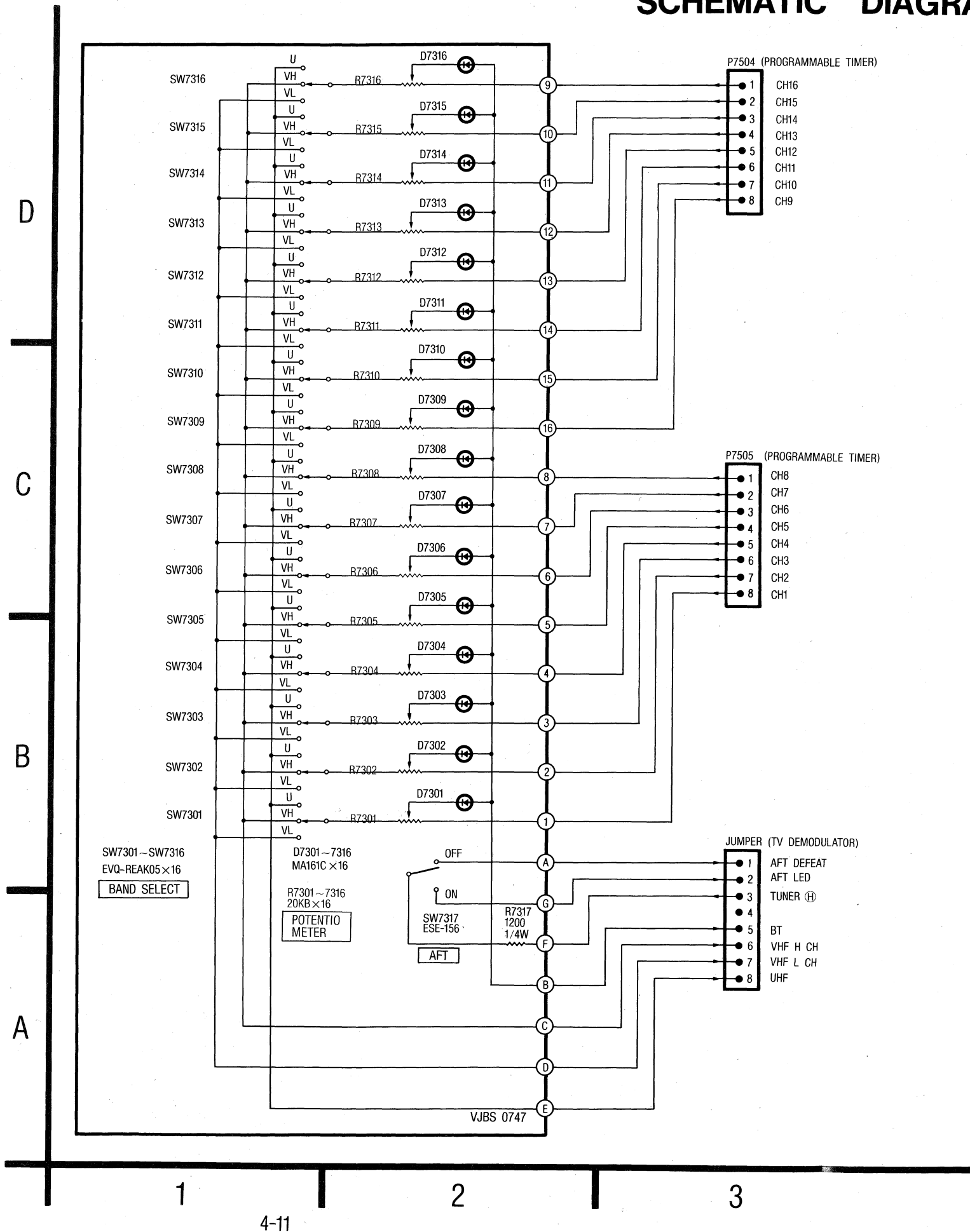
P4006

1	
2	DOLBY
3	REG +12V
4	DOLBY
5	REC
6	AUDIO
7	GND
8	EEⓈ/RECⓈ/A DⓈ

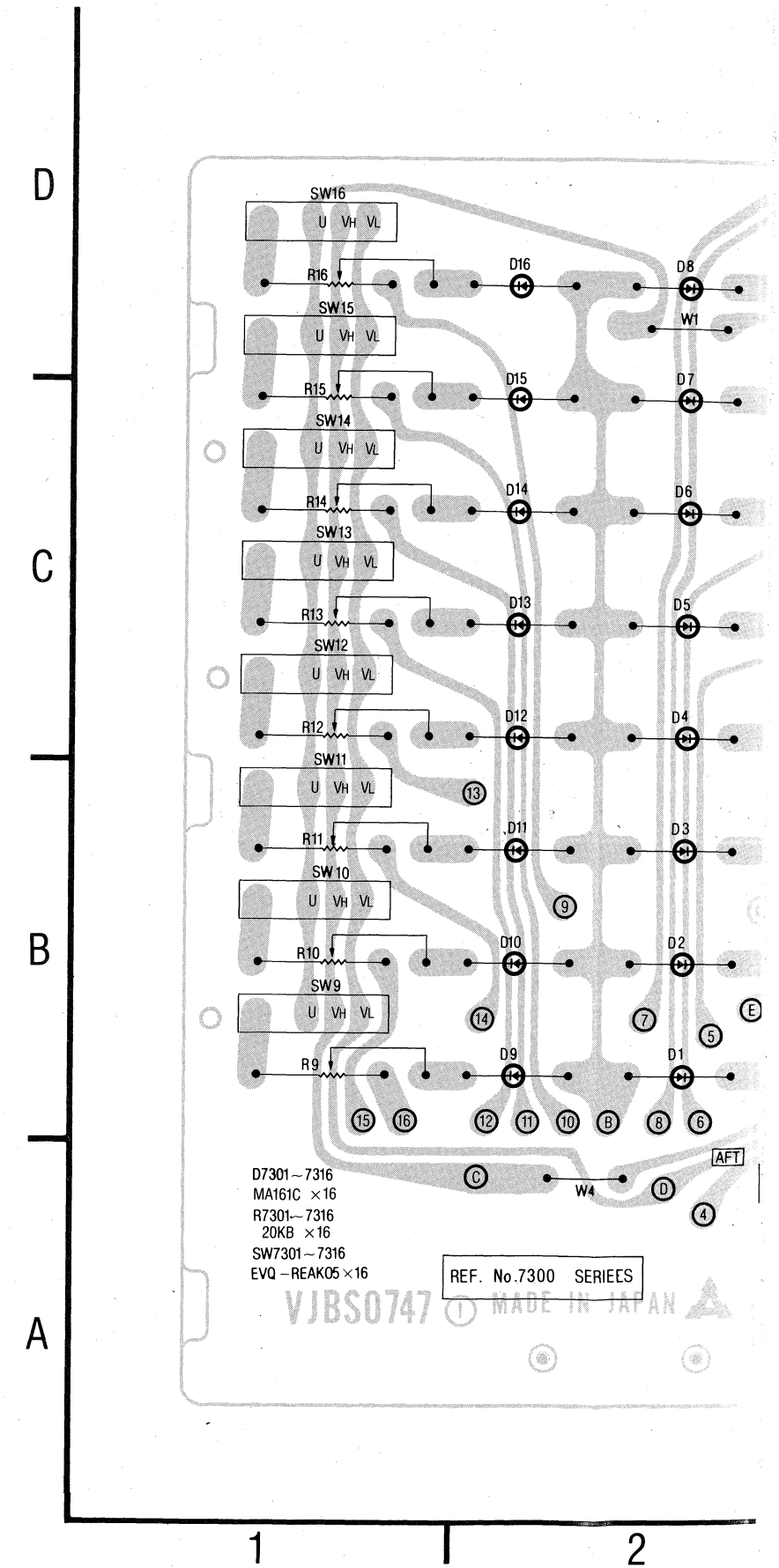
AUDIO (II) & DOLBY C.B.A.

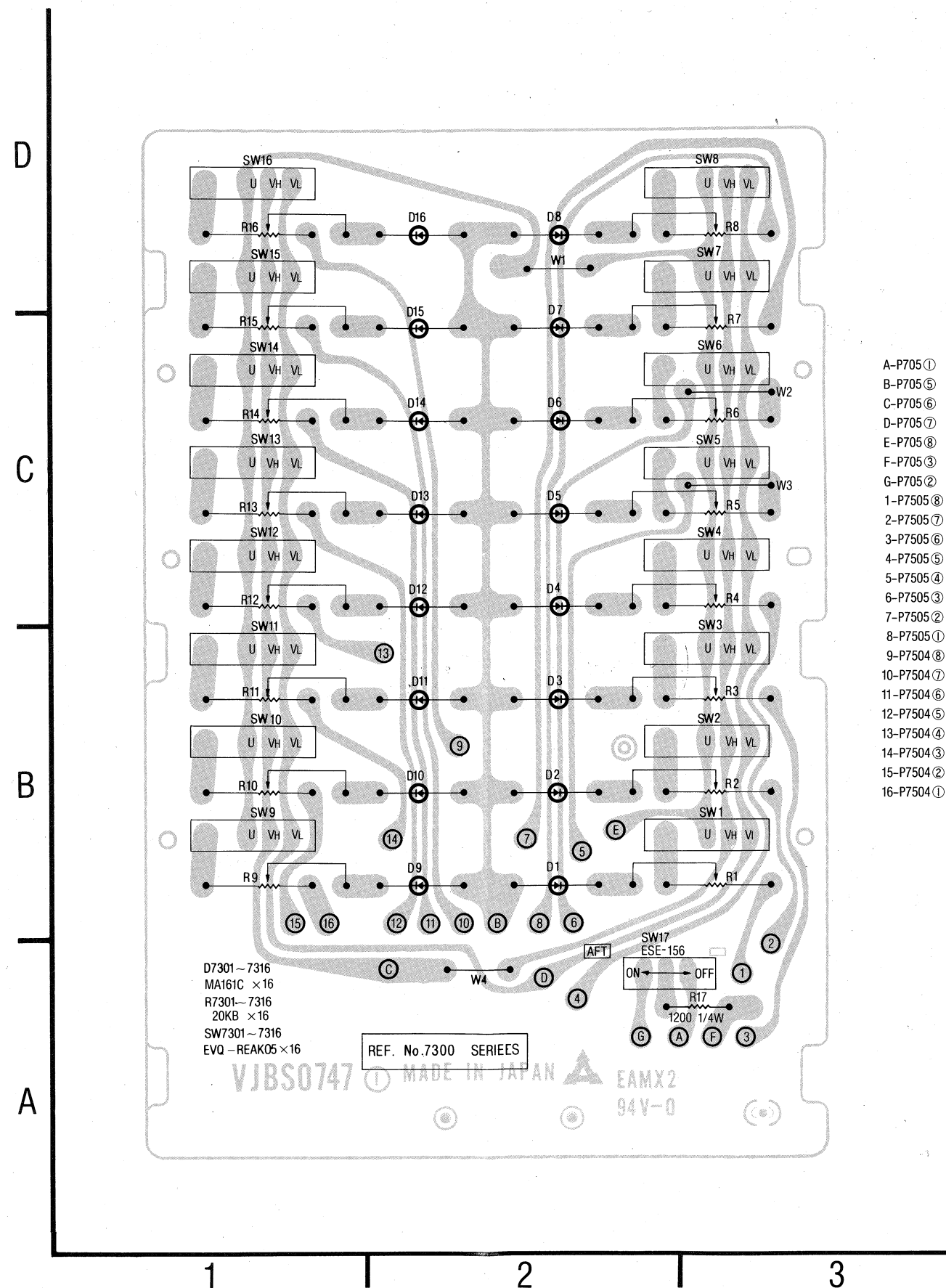
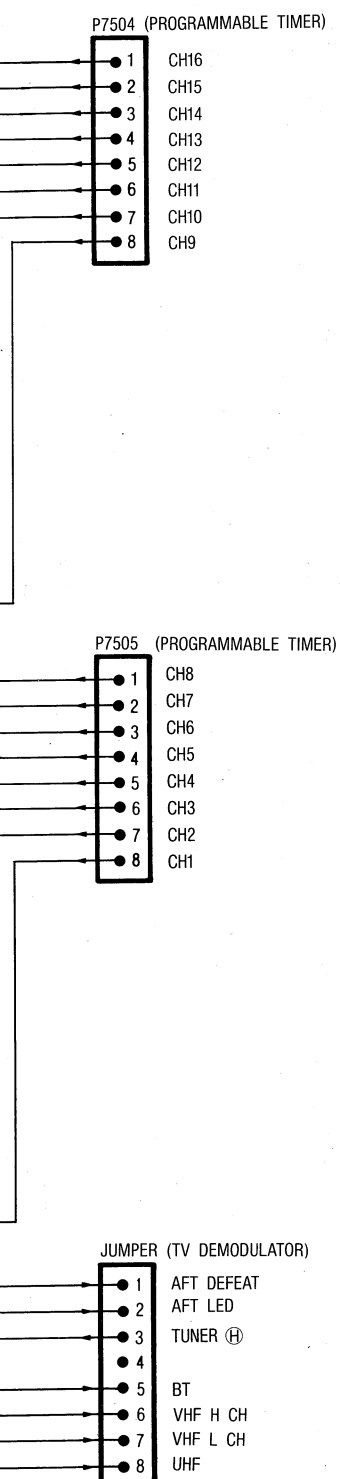


UHF/VHF BAND SELECT SWITCHES & POTENTIOMETER SCHEMATIC DIAGRAM



UHF/VHF BAND SELECT SWITCHES & POT





TIMER OPERATION C.B.A. VEPS0663A

VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL
SP STOP MODE.

TIMER DISPLAY TUBE
SWITCH (SW7227) IS

D

C

B

A

P7201

1	AC 3V
2	AC 3V

P7202

1	8G
2	7G
3	6G
4	1G
5	2G
6	3G
7	5G
8	4G
9	-V
10	SEGMENT P(COL)

JUMPER

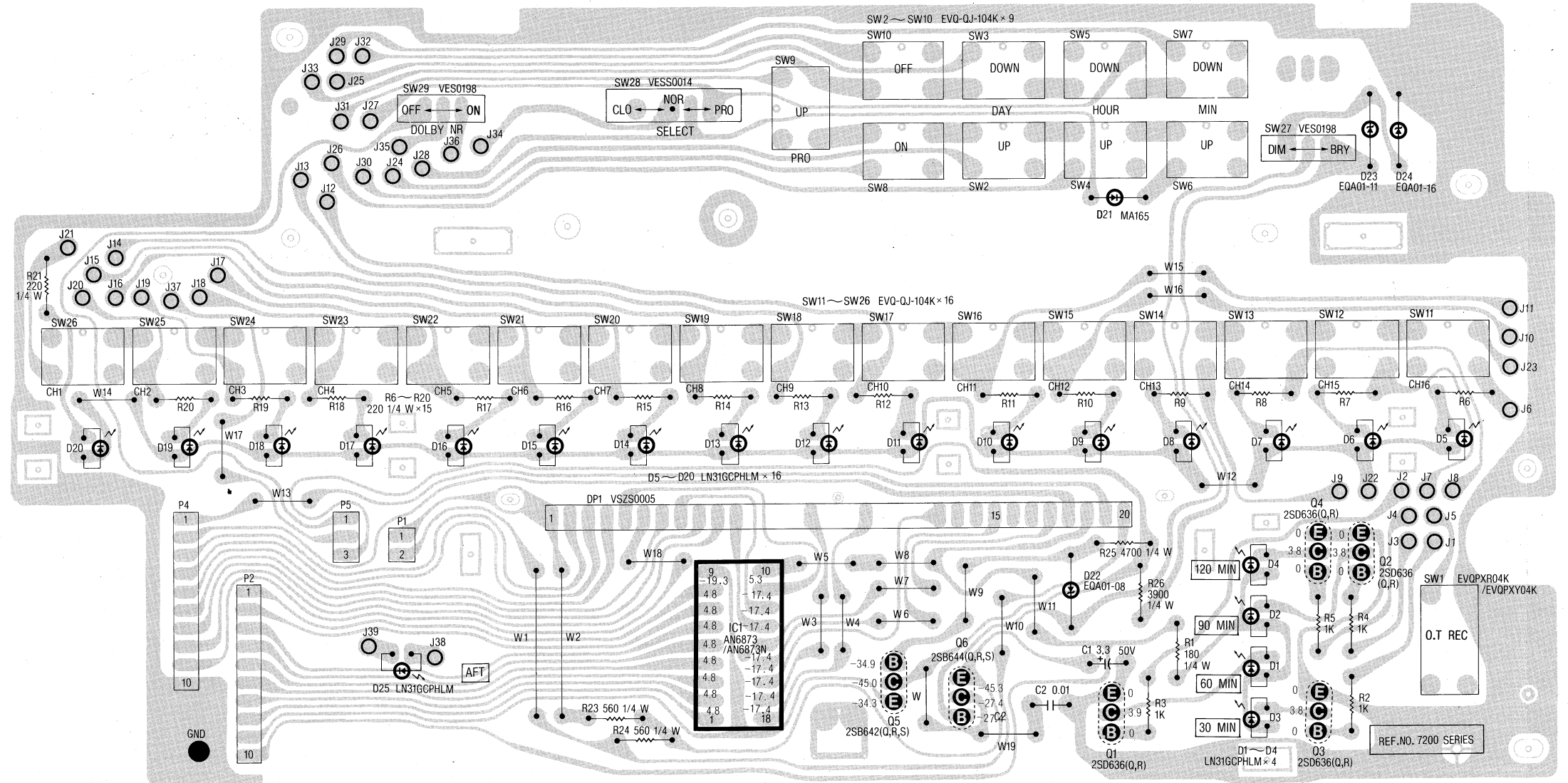
19	CH3
14	CH8
15	CH7
16	CH6
22	CH LED
20	CH2
21	CH1
23	CH SELECT
17	CH5
18	CH4

P7204

1	SEGMENT P(X)
2	SEGMENT P(Y)
3	SEGMENT a
4	SEGMENT b
5	SEGMENT c
6	SEGMENT e
7	SEGMENT f
8	SEGMENT g
9	SEGMENT d
10	GND

P7205

1	DOLBY NR (H)
2	UNREG +11V
3	UNREG -45V



JUMPER

1	30 min
2	60 min
3	90 min
4	120 min
5	EXPRESS RE
6	CH16
7	CH15
8	CH14
9	CH13
10	CH12
11	CH11
12	CH10
13	CH9

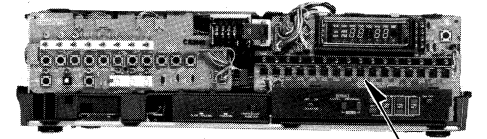
JUMPER

24	DAY UP
25	DAY DOWN
26	HOUR UP
27	HOUR DOWN
28	MIN UP
29	MIN DOWN
30	PROG ON
31	PROG UP
32	PROG OFF
33	MODE SELEC
34	PROG/NORM
35	REG +12V
36	DOLBY LED
37	POWER STOP
38	AFT LED
39	GND

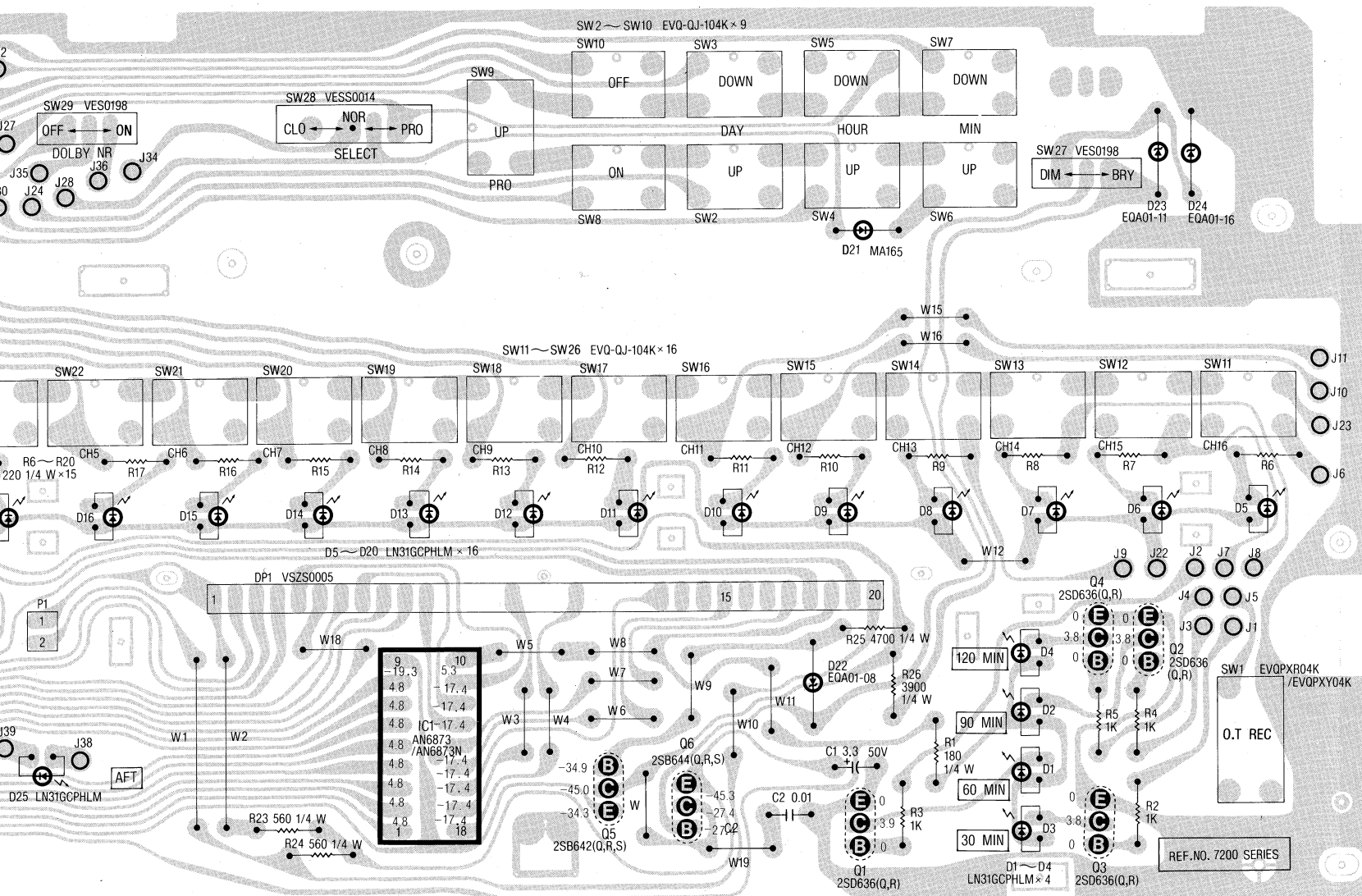
VEPS0663A

VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL IN
SP STOP MODE.

TIMER DISPLAY TUBE IS FLASHING, AND DIM/BRT
SWITCH (SW7227) IS BRT.



TIMER OPERATION
& CHANNEL SWITCHES C.B.A.



JUMPER

1	30 min
2	60 min
3	90 min
4	120 min
5	EXPRESS REC
6	CH16
7	CH15
8	CH14
9	CH13
10	CH12
11	CH11
12	CH10
13	CH9

24	DAY UP
25	DAY DOWN
26	HOUR UP
27	HOUR DOWN
28	MIN UP
29	MIN DOWN
30	PROG ON
31	PROG UP
32	PROG OFF
33	MODE SELECT
34	PROG/NORM/CLOCK
35	REG +12V
36	DOLBY LED
37	POWER STOP
38	AFT LED
39	GND

TIMER OPERATING & CH SELECT C.B.A.	
Q1	6-A
Q2	6-B
Q3	6-A
Q4	6-B
Q5	5-A
Q6	5-A

3

4

5

6

7

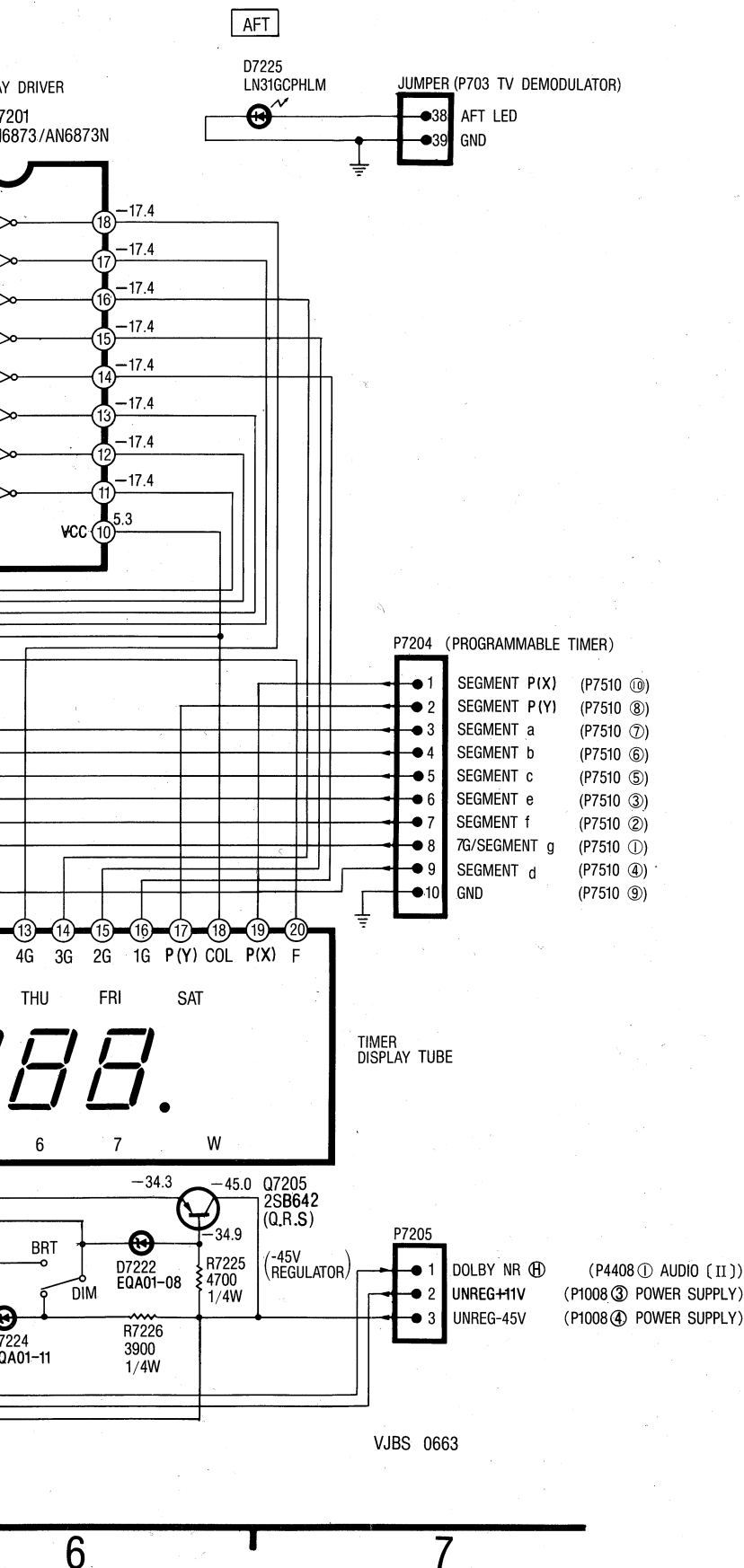
8

NOTE : REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
EXAMPLE : C.B.A.....R2, REF. NO. 7200
SERIES SCHEMATIC DIAGRAM.....
7202 (7202 IS ABBREVIATED
TO R2)

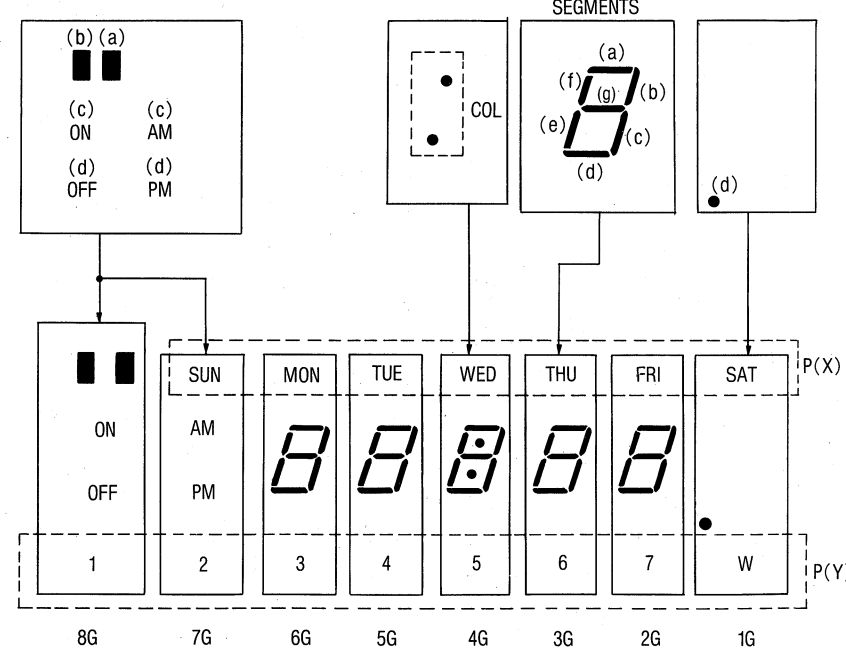
C.A. IS PRINTED AS FOLLOWS.
.....R2, REF. NO. 7200
ES SCHEMATIC DIAGRAM.....
2 (7202 IS ABBREVIATED
(2)

VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL IN
SP STOP MODE.

TIMER DISPLAY TUBE IS FLASHING, AND DIM/BRT
SWITCH (SW7227) IS BRT.



TIMER DISPLAY (DP7201)
CONNECTION CHART



PIN NO.	1	2	3	4	5	6	7	8	9	10
SIGNAL NAME	F	a	b	c	8G	d	e	7G	f	g

PIN NO.	11	12	13	14	15	16	17	18	19	20
SIGNAL NAME	6G	5G	4G	3G	2G	1G	P (Y)	COL	P (X)	F

JUNPER		
PIN NO.	SIGNAL NAME	DESTINATION
38	AFT LED	P703-1 TV DEMODULATOR C.B.A.
39	GND	P703-2 TV DEMODULATOR C.B.A.

P7201 (TIMER OPERATION & CH SWITCHES C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	AC 3V	POWER TRANSFORMER [II] C.B.A.
2	AC 3V	POWER TRANSFORMER [II] C.B.A.

P7202 (TIMER OPERATION & CH SWITCHES C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	8G	P7511-1 PROGRAMMABLE TIMER C.B.A.
2	7G	P7511-2 PROGRAMMABLE TIMER C.B.A.
3	6G	P7511-3 PROGRAMMABLE TIMER C.B.A.
4	1G	P7511-8 PROGRAMMABLE TIMER C.B.A.
5	2G	P7511-7 PROGRAMMABLE TIMER C.B.A.
6	3G	P7511-6 PROGRAMMABLE TIMER C.B.A.
7	5G	P7511-4 PROGRAMMABLE TIMER C.B.A.
8	4G	P7511-5 PROGRAMMABLE TIMER C.B.A.
9	-V	P7511-10 PROGRAMMABLE TIMER C.B.A.
10	SEGMENT P(col)	P7511-9 PROGRAMMABLE TIMER C.B.A.

JUMPER (TIMER OPERATION & CH SWITCHES C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
19	CH3	P7507-8 PROGRAMMABLE TIMER C.B.A.
14	CH8	P7507-3 PROGRAMMABLE TIMER C.B.A.
15	CH7	P7507-4 PROGRAMMABLE TIMER C.B.A.
16	CH6	P7507-5 PROGRAMMABLE TIMER C.B.A.
22	CH LED	P7506-1 PROGRAMMABLE TIMER C.B.A.
20	CH2	P7507-9 PROGRAMMABLE TIMER C.B.A.
21	CH1	P7507-10 PROGRAMMABLE TIMER C.B.A.
23	CH SELECT	P7506-2 PROGRAMMABLE TIMER C.B.A.
17	CH5	P7507-6 PROGRAMMABLE TIMER C.B.A.
18	CH4	P7507-7 PROGRAMMABLE TIMER C.B.A.

P7204 (TIMER OPERATION & CH SWITCHES C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	SEGMENT P(X)	P7510-10 PROGRAMMABLE TIMER C.B.A.
2	SEGMENT P(Y)	P7510-8 PROGRAMMABLE TIMER C.B.A.
3	SEGMENT a	P7510-7 PROGRAMMABLE TIMER C.B.A.
4	SEGMENT b	P7510-6 PROGRAMMABLE TIMER C.B.A.
5	SEGMENT c	P7510-5 PROGRAMMABLE TIMER C.B.A.
6	SEGMENT e	P7510-3 PROGRAMMABLE TIMER C.B.A.
7	SEGMENT f	P7510-2 PROGRAMMABLE TIMER C.B.A.
8	SEGMENT g	P7510-1 PROGRAMMABLE TIMER C.B.A.
9	SEGMENT d	P7510-4 PROGRAMMABLE TIMER C.B.A.
10	GND	P7510-9 PROGRAMMABLE TIMER C.B.A.

P7205 (TIMER OPERATION & CH SWITCHES C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	DOLBY NR (H)	P4408-1 AUDIO [II] & DOLBY C.B.A.
2	UNREG+11V	P1008-3 POWER SUPPLY C.B.A.
3	UNREG-45V	P1008-4 POWER SUPPLY C.B.A.

JUMPER (TIMER OPERATION & CH SWITCHES C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	30min	P7601-5 ONE TOUCH RECORDING C.B.A.
2	60min	P7601-4 ONE TOUCH RECORDING C.B.A.
3	90min	P7601-3 ONE TOUCH RECORDING C.B.A.
4	120min	P7601-2 ONE TOUCH RECORDING C.B.A.
5	ONE TOUCH REC	P7601-1 ONE TOUCH RECORDING C.B.A.

JUMPER (TIMER OPERATION & CH SWITCHES C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
6	CH16	P7506-3 PROGRAMMABLE TIMER C.B.A.
7	CH15	P7506-4 PROGRAMMABLE TIMER C.B.A.
8	CH14	P7506-5 PROGRAMMABLE TIMER C.B.A.
9	CH13	P7506-6 PROGRAMMABLE TIMER C.B.A.
10	CH12	P7506-7 PROGRAMMABLE TIMER C.B.A.
11	CH11	P7506-8 PROGRAMMABLE TIMER C.B.A.
12	CH10	P7507-1 PROGRAMMABLE TIMER C.B.A.
13	CH9	P7507-2 PROGRAMMABLE TIMER C.B.A.

JUMPER (TIMER OPERATION & CH SWITCHES C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
24	DAY UP	P7509-11 PROGRAMMABLE TIMER C.B.A.
25	DAY DOWN	P7509-10 PROGRAMMABLE TIMER C.B.A.
26	HOUR UP	P7509-9 PROGRAMMABLE TIMER C.B.A.
27	HOUR DOWN	P7509-8 PROGRAMMABLE TIMER C.B.A.
28	MIN UP	P7509-7 PROGRAMMABLE TIMER C.B.A.
29	MIN DOWN	P7509-6 PROGRAMMABLE TIMER C.B.A.
30	PROG ON	P7509-5 PROGRAMMABLE TIMER C.B.A.
31	PROG UP	P7509-4 PROGRAMMABLE TIMER C.B.A.
32	PROG OFF	P7509-3 PROGRAMMABLE TIMER C.B.A.
33	MODE SELECT	P7509-2 PROGRAMMABLE TIMER C.B.A.
34	PROG/NORM/CLOCK	P7509-1 PROGRAMMABLE TIMER C.B.A.
35	REG+12V	P6302-1 OPERATION C.B.A.
36	DOLBY LED	P6302-2 OPERATION C.B.A.
37	POWER STOP	P7509-12 PROGRAMMABLE TIMER C.B.A.

4-14 PROGRAMMABLE TIMER

PROGRAMMABLE TIMER C.B.A. VEPS0653A

NOTE : DISCONNECT CONNECTOR P7503 WHEN REPLACING PARTS ON TIMER CIRCUIT BOARD.

VOLTAGE MEAS

P7502

1	CH LOCK(H)
2	TIMER LED
3	POWER LED
4	CASSETTE DOWN
5	TIMER REC
6	TIMER SET(H)
7	CH UP
8	

P7501

1	GND
2	POWER STOP
3	REG+13V
4	REG+6V
5	

P7503

1	GND
2	
3	BACKUP

P7504

1	CH16
2	CH15
3	CH14
4	CH13
5	CH12
6	CH11
7	CH10
8	CH9

P7505

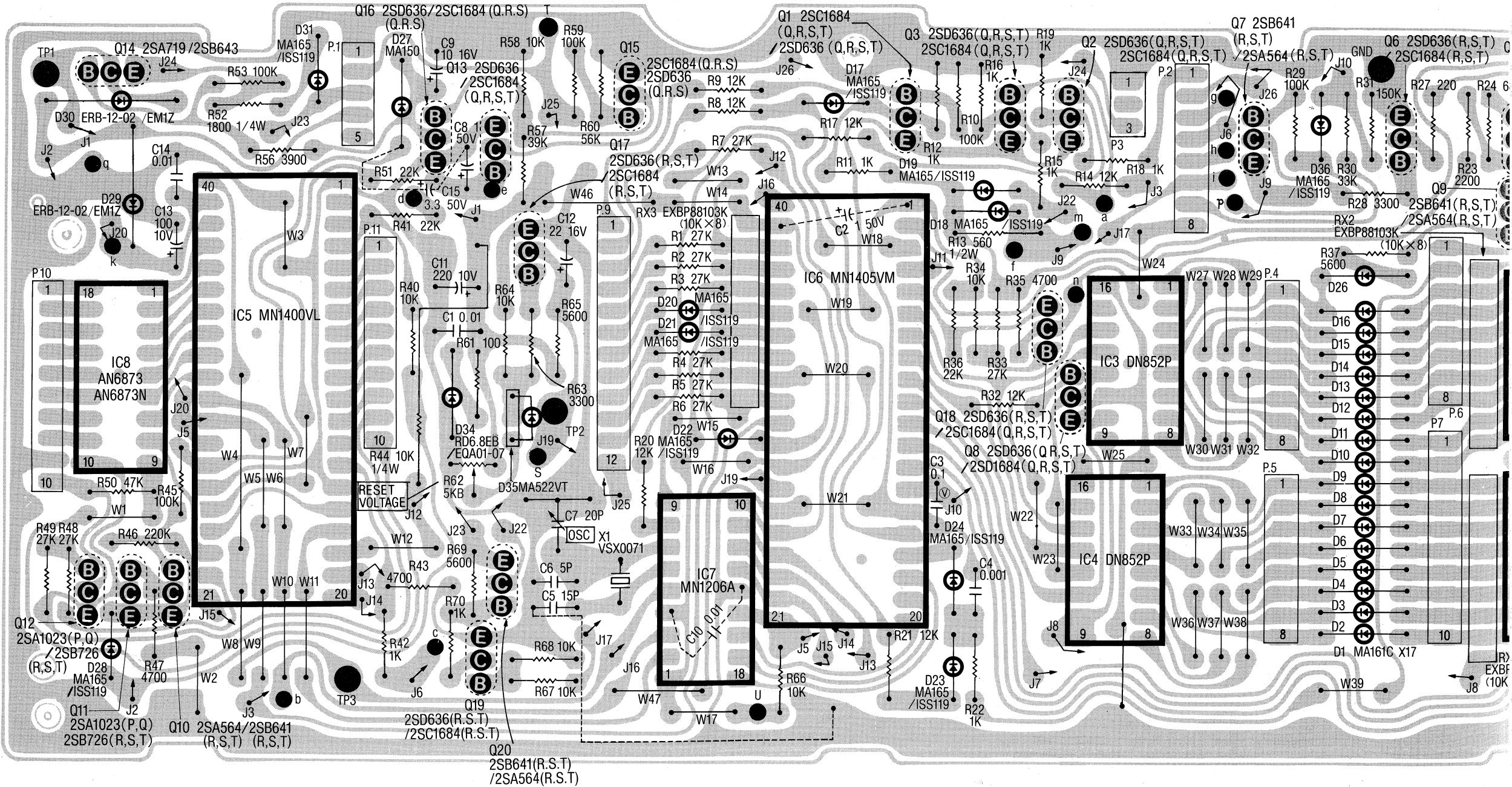
1	CH8
2	CH7
3	CH6
4	CH5
5	CH4
6	CH3
7	CH2
8	CH1

P7506

1	CH LED
2	CH SELECT
3	CH 16
4	CH 15
5	CH 14
6	CH 13
7	CH 12
8	CH 11

JUMPER

a	TIMER SET INHIBIT
b	64Hz
c	SAFETY TAB(H)
d	8PRO/2W ON
e	TIMER LED ON
f	REG +12V
g	POWER (H)
h	TIMER REC
i	TIMER SET (H)
k	REG+5V
q	GND

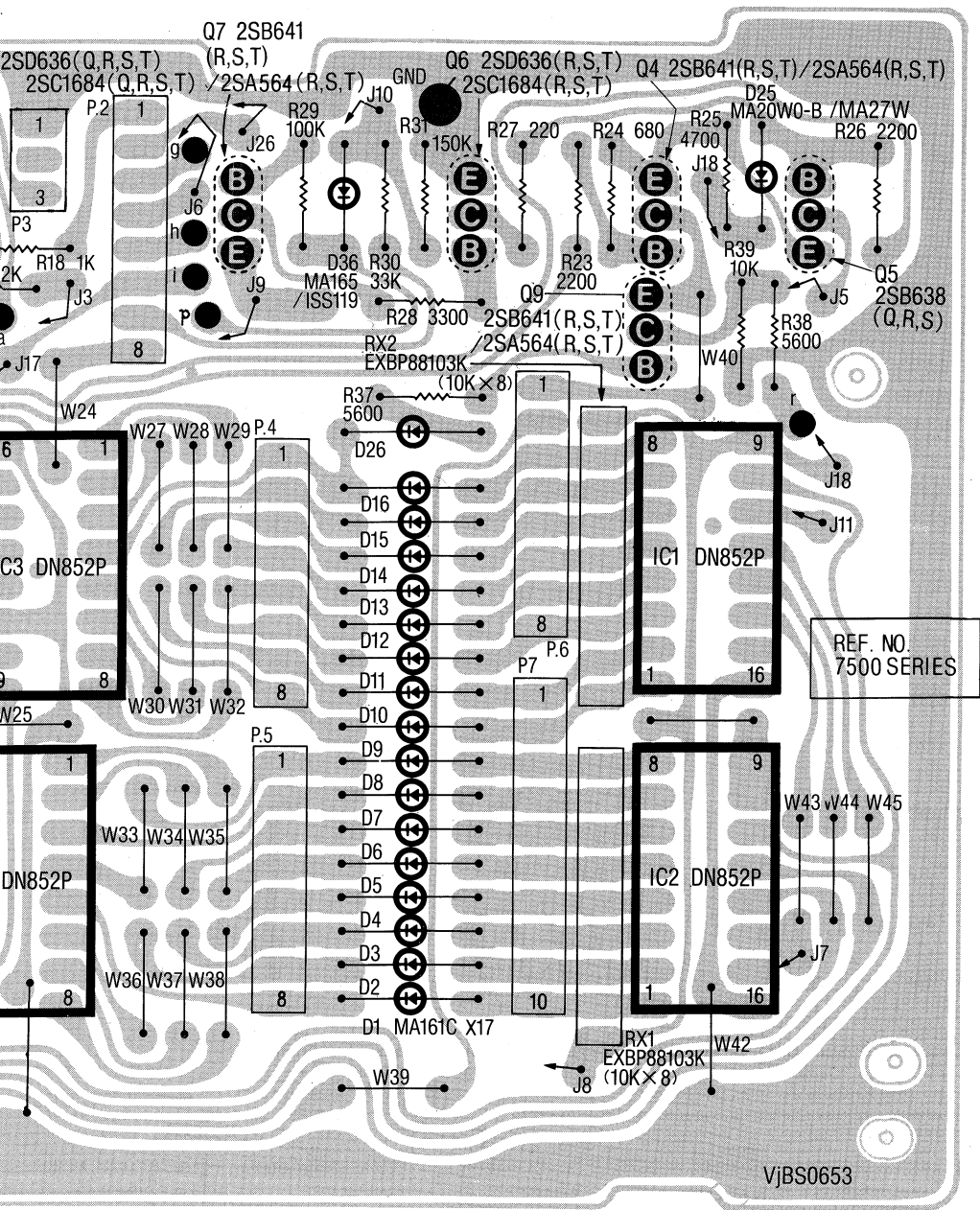


R P7503 WHEN
TIMER CIRCUIT

VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL IN
SP STOP MODE.

JUMPER

S	TIMER RESET
T	POWER STOP
U	TIMER BACKUP
P	TUNER (H)
N	AFT DEFEAT
R	CATV
M	REG +12V



P7507

1	CH10
2	CH 9
3	CH 8
4	CH 7
5	CH 6
6	CH 5
7	CH 4
8	CH 3
9	CH 2
10	CH 1

P7509

1	PROG/NORM/CLOCK
2	MODE SELECT
3	PROG UP
4	PROG OFF
5	PROG ON
6	MIN DOWN
7	MIN UP
8	HOUR DOWN
9	HOUR UP
10	DAY DOWN
11	DAY UP
12	POWER STOP

P7510

1	SEGMENT g
2	SEGMENT f
3	SEGMENT e
4	SEGMENT d
5	SEGMENT c
6	SEGMENT b
7	SEGMENT a
8	SEGMENT P(Y)
9	GND
10	SEGMENT P(X)

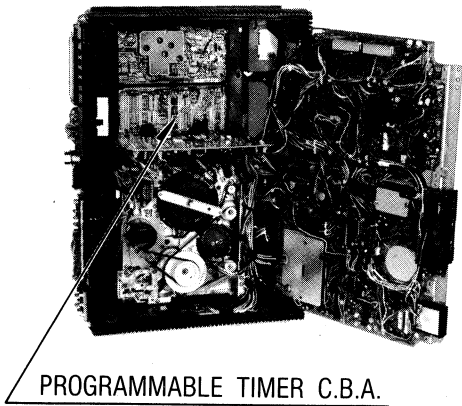
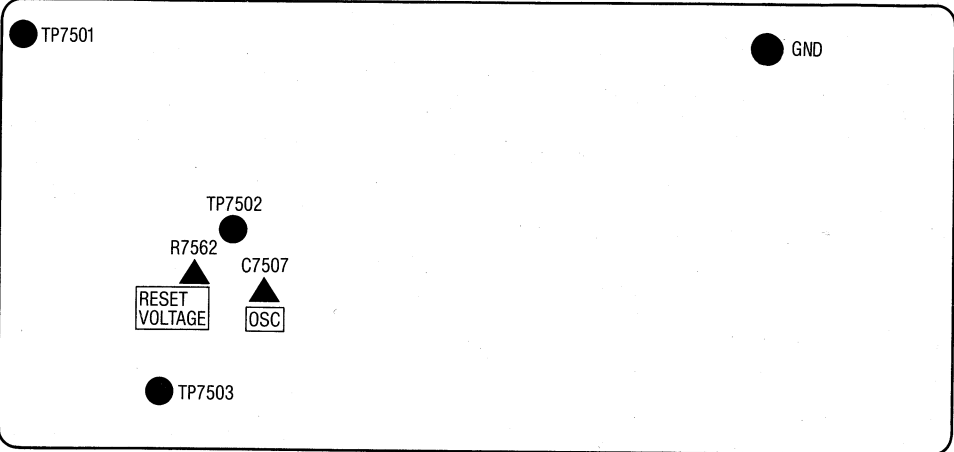
P7511

1	8G
2	7G
3	6G
4	5G
5	4G
6	3G
7	2G
8	1G
9	SEGMENT P(col)
10	-V

PROGRAMMABLE
TIMER C.B.A.

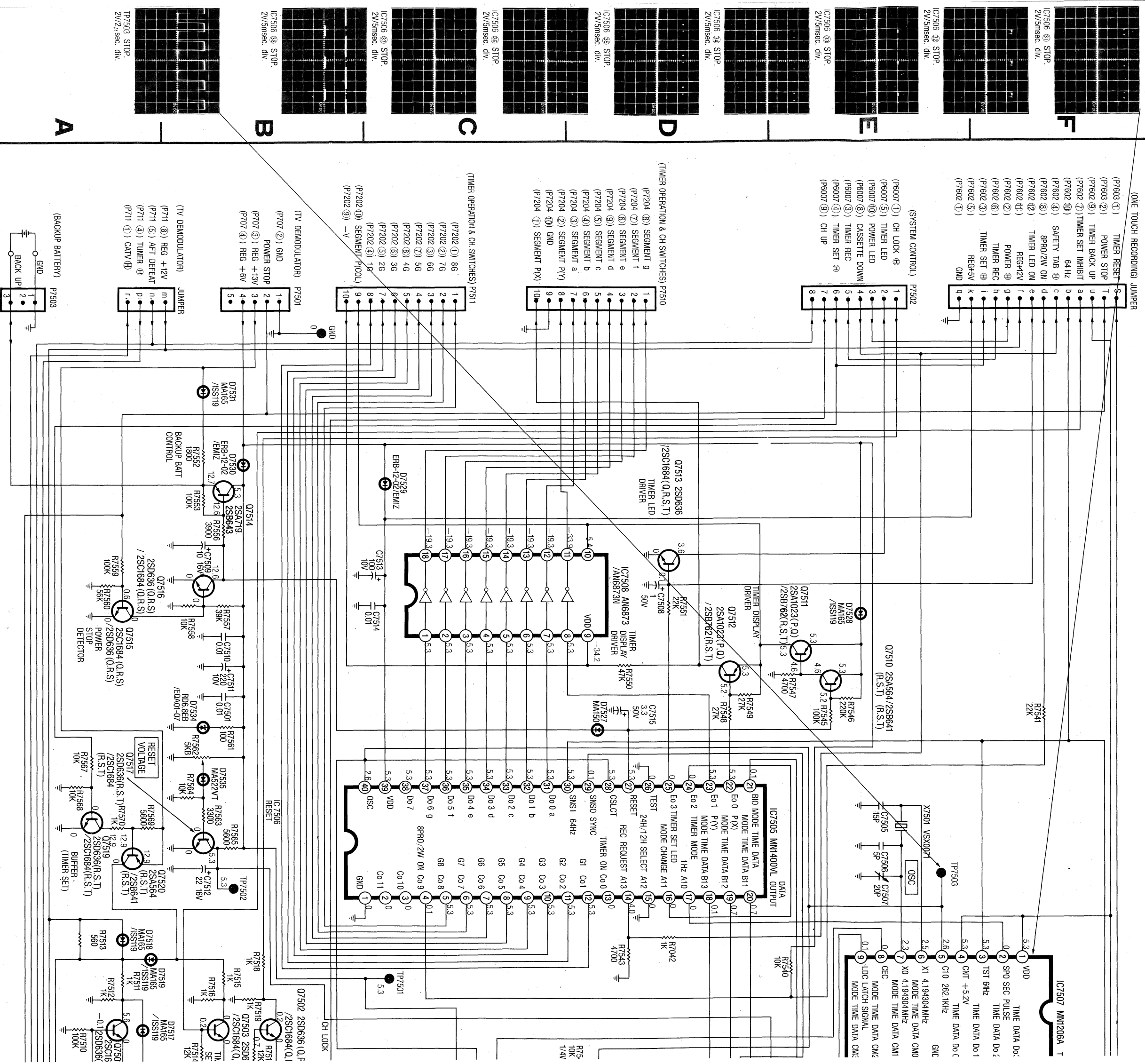
Q1	4-C
Q2	5-C
Q3	5-C
Q4	6-C
Q5	7-C
Q6	6-C
Q7	5-C
Q8	5-B
Q9	6-C
Q10	2-A
Q11	2-A
Q12	2-A
Q13	3-C
Q14	2-C
Q15	3-C
Q16	3-C
Q17	3-B
Q18	5-B
Q19	3-A
Q20	3-A

LOCATION OF TEST POINTS & ADJUSTMENT POINTS



PROGRAMMABLE TIMER SCHEMATIC DIAGRAM

NOTE : DISCONNECT CONNECTOR P7503
REPLACING PARTS ON TIMER CIRCUIT
BOARD.



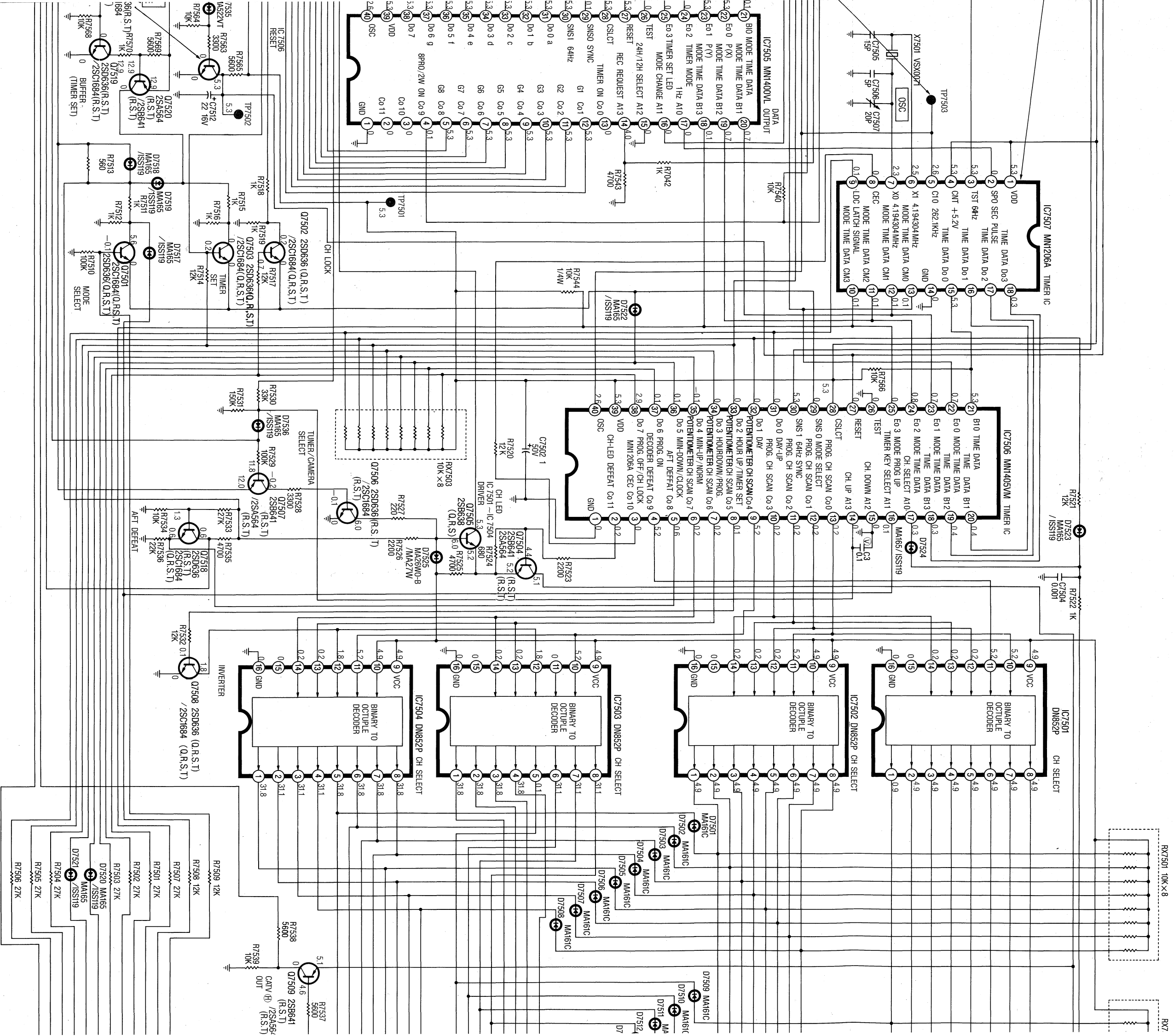
NOTE : DISCONNECT CONNECTOR P 7503 WHEN REPLACING PARTS ON TIMER CIRCUIT BOARD.

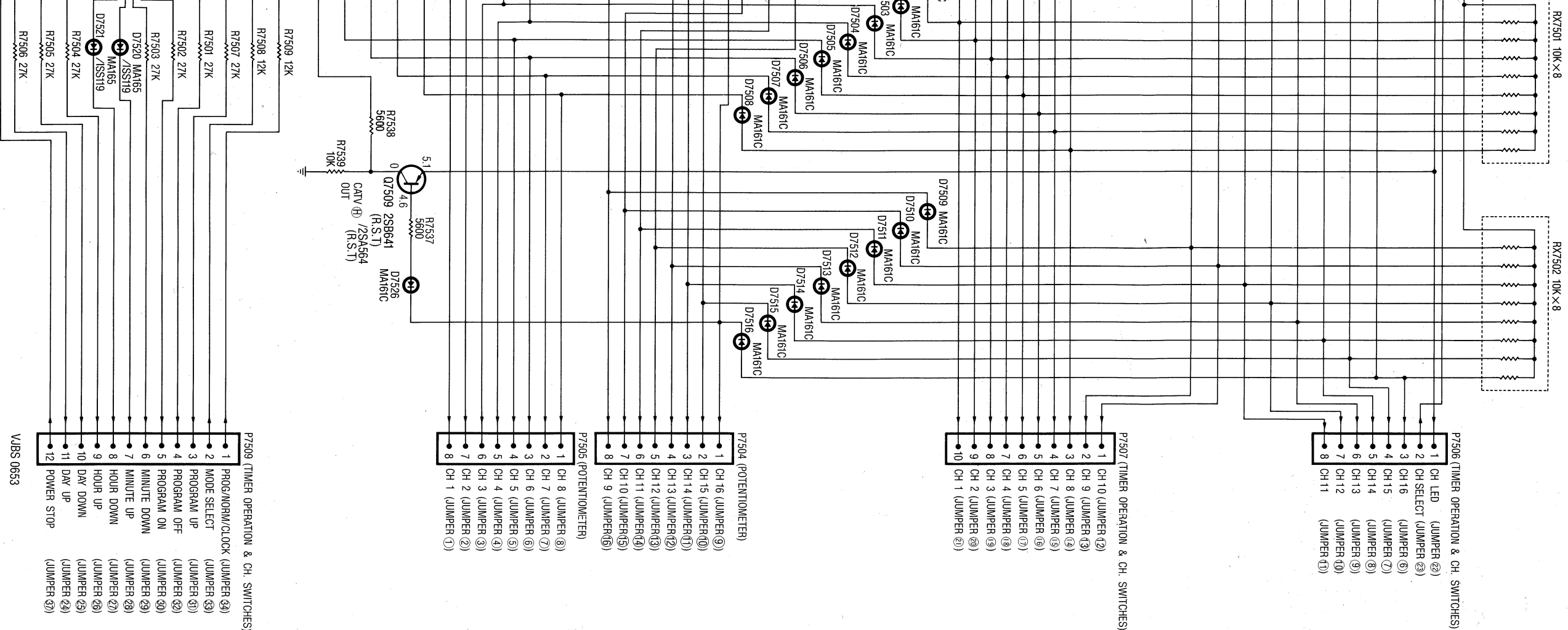
NOTE : REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.

EXAMPLE : C.B.A.....R2, REF. NO. 7500

SERIES SCHEMATIC DIAGRAM.....
7502 (7502 IS ABBREVIATED
TO R2)

VOLTAGE MEASUREMENTS : COLOR BAR SIGN,
SP STOP MODE.





P7501 (PROGRAMMABLE TIMER C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	P707-2 TV DEMODULATOR C.B.A.
2	POWER STOP	P707-3 TV DEMODULATOR C.B.A.
3	REG +13V	P707-4 TV DEMODULATOR C.B.A.
4	REG +6V	
5		

P7502 (PROGRAMMABLE TIMER C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	CH LOCK ⑨	P607-1 SYSTEM CONTROL C.B.A.
2	TIMER LED	P607-5 SYSTEM CONTROL C.B.A.
3	POWER LED	P607-10 SYSTEM CONTROL C.B.A.
4	CASSETTE DOWN	P607-8 SYSTEM CONTROL C.B.A.
5	TIMER REC	P607-3 SYSTEM CONTROL C.B.A.
6	TIMER SET ⑩	P607-4 SYSTEM CONTROL C.B.A.
7	CH UP	P607-9 SYSTEM CONTROL C.B.A.
8		

P7503 (PROGRAMMABLE TIMER C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	BACKUP BATTERY
2		
3	BACKUP	BACKUP BATTERY

P7504 (PROGRAMMABLE TIMER C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	CH16	JUMPER-9 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.
2	CH15	JUMPER-10 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.
3	CH14	JUMPER-11 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.
4	CH13	JUMPER-12 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.
5	CH12	JUMPER-13 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.
6	CH11	JUMPER-14 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.
7	CH10	JUMPER-15 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.
8	CH 9	JUMPER-16 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.

P7505 (PROGRAMMABLE TIMER C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	CH8	JUMPER-8 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.
2	CH7	JUMPER-7 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.
3	CH6	JUMPER-6 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.
4	CH5	JUMPER-5 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.
5	CH4	JUMPER-4 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.
6	CH3	JUMPER-3 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.
7	CH2	JUMPER-2 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.
8	CH1	JUMPER-1 UHF/VHF BAND SELECT SWITCHES & POTENTIOMETERS C.B.A.

P7506 (PROGRAMMABLE TIMER C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	CH LED	JUMPER-22TIMER OPERATION & CHANNEL SWITCHES C.B.A.
2	CH SELECT	JUMPER-23TIMER OPERATION & CHANNEL SWITCHES C.B.A.
3	CH16	JUMPER-6 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
4	CH15	JUMPER-7 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
5	CH14	JUMPER-8 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
6	CH13	JUMPER-9 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
7	CH12	JUMPER-10 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
8	CH11	JUMPER-11 TIMER OPERATION & CHANNEL SWITCHES C.B.A.

P7507 (PROGRAMMABLE TIMER C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	CH10	JUMPER-12 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
2	CH9	JUMPER-13 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
3	CH8	JUMPER-14 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
4	CH7	JUMPER-15 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
5	CH6	JUMPER-16 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
6	CH5	JUMPER-17 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
7	CH4	JUMPER-18 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
8	CH3	JUMPER-19 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
9	CH2	JUMPER-20TIMER OPERATION & CHANNEL SWITCHES C.B.A.
10	CH1	JUMPER-21TIMER OPERATION & CHANNEL SWITCHES C.B.A.

P7508 (PROGRAMMABLE TIMER C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	PROG/NORM/CLOCK	JUMPER-34 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
2	MODE SELECT	JUMPER-33 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
3	PROG UP	JUMPER-31 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
4	PROG OFF	JUMPER-32 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
5	PROG ON	JUMPER-30 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
6	MIN DOWN	JUMPER-29 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
7	MIN UP	JUMPER-28 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
8	HOURL DOWN	JUMPER-27 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
9	HOURL UP	JUMPER-26 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
10	DAY DOWN	JUMPER-25 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
11	DAY UP	JUMPER-24 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
12	POWER STOP	JUMPER-37 TIMER OPERATION & CHANNEL SWITCHES C.B.A.

P7510 (PROGRAMMABLE TIMER C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	SEGMENT g	P7204-8 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
2	SEGMENT f	P7204-7 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
3	SEGMENT e	P7204-6 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
4	SEGMENT d	P7204-5 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
5	SEGMENT c	P7204-4 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
6	SEGMENT b	P7204-3 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
7	SEGMENT a	P7204-2 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
8	SEGMENT P(V)	P7204-10 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
9	GND	
10	SEGMENT P(X)	P7204-11 TIMER OPERATION & CHANNEL SWITCHES C.B.A.

P7511 (PROGRAMMABLE TIMER C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	8.6	P7202-1 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
2	7.6	P7202-2 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
3	6.6	P7202-3 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
4	5.6	P7202-7 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
5	4.6	P7202-6 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
6	3.6	P7202-8 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
7	2.6	P7202-5 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
8	1.6	P7202-4 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
9	SEGMENT P(g)	P7202-10 TIMER OPERATION & CHANNEL SWITCHES C.B.A.
10	-V	P7202-9 TIMER OPERATION & CHANNEL SWITCHES C.B.A.

JUMPER (PROGRAMMABLE TIMER C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
a	TIMER SET INHIBIT	P7602-7 EXPRESS RECORDING C.B.A.
b	64Hz	P7602-10 EXPRESS RECORDING C.B.A.
c	SAFETY TAB ⑩	P7602-4 EXPRESS RECORDING C.B.A.
d	8PHD/2W ON	P7602-8 EXPRESS RECORDING C.B.A.
e	TIMER LED ON	P7602-12 EXPRESS RECORDING C.B.A.
f	REG +12V	P7602-11 EXPRESS RECORDING C.B.A.
g	POWER ⑩	P7602-2 EXPRESS RECORDING C.B.A.
h	TIMER REC	P7602-6 EXPRESS RECORDING C.B.A.
i	TIMER SET ⑩	P7602-3 EXPRESS RECORDING C.B.A.
j	REG +5V	P7602-5 EXPRESS RECORDING C.B.A.
k		
q	GND	P7602-1 EXPRESS RECORDING C.B.A.

JUMPER (PROGRAMMABLE TIMER C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
S	TIMER RESET	P7603-1 EXPRESS RECORDING C.B.A.
T	POWER STOP	P7603-2 EXPRESS RECORDING C.B.A.
U	TIMER BACKUP	P7602-9 EXPRESS RECORDING C.B.A.
P	TUNER ⑩	P711-4 TV DEMODULATOR C.B.A.
N	AFT DEFEAT	P711-5 TV DEMODULATOR C.B.A.
R	CATV	P711-1 TV DEMODULATOR C.B.A.
M	REG +12V	P711-8 TV DEMODULATOR C.B.A.

TV DEMODULATOR C.B.A. VEP50745A1

P702

1	TUNER (H)
2	AUDIO
3	GND
4	VIDEO
5	GND

P704

1	REG +13V
2	UNREG +45V
3	GND
4	REG +6V
5	REG +12V

P705

1	AFT DEFEAT
2	AFT LED
3	TUNER (H)
4	
5	BT
6	VHF H CH
7	VHF L CH
8	UHF

P707

1	UNREG +45V
2	GND
3	REG +13V
4	REG +6V
5	

P708

1	SW2
2	SW1

P710

1	TV/VCR
2	GND

P711

1	CATV
2	
3	
4	TUNER (H)
5	AFT DEFEAT
6	GND
7	REG +6V
8	REG +12V

P713

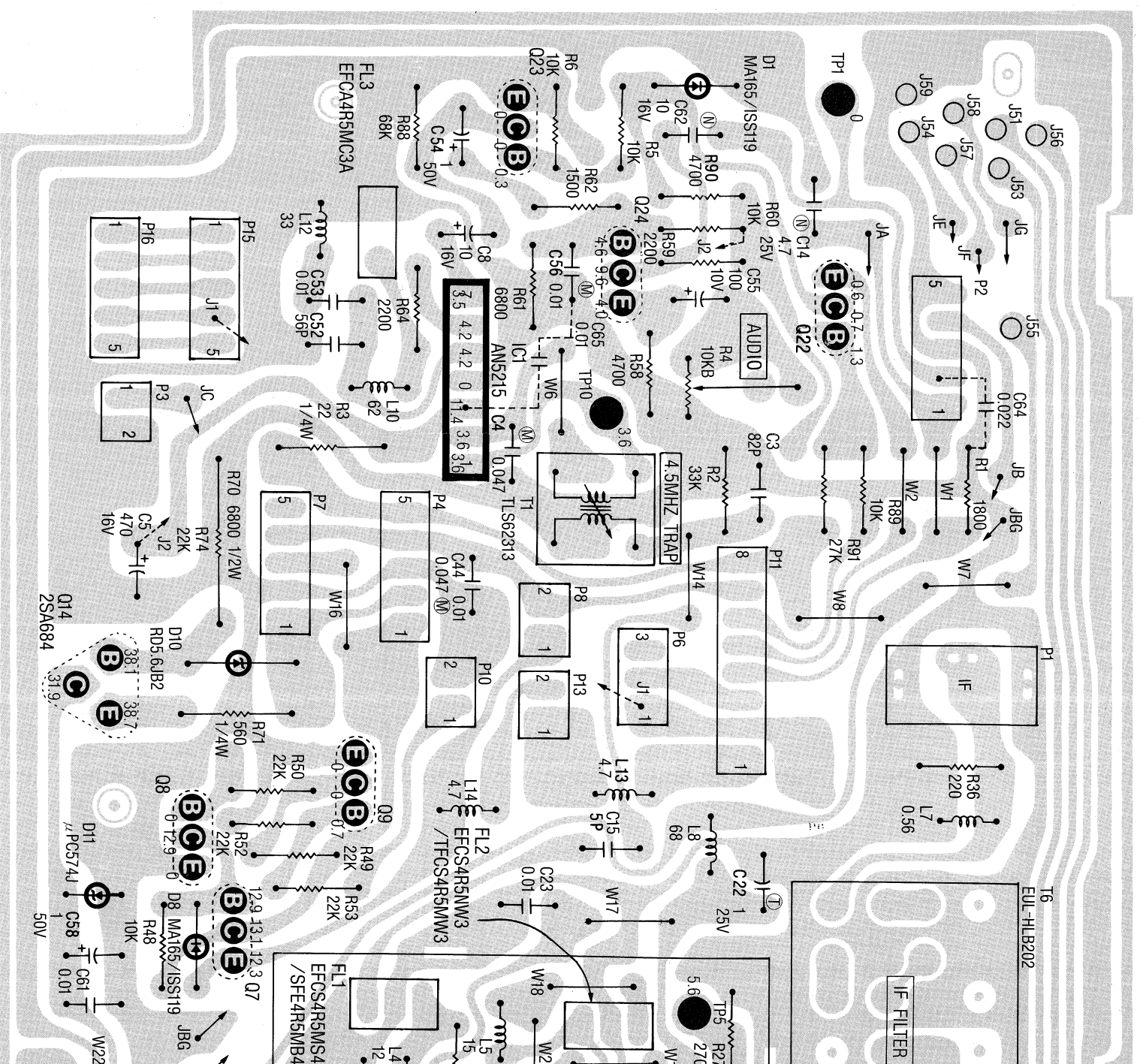
1	CATV
2	TV/VCR

P715

1	AUDIO
2	+9V
3	GND
4	GND
5	VIDEO

P703

1	AFT LED
2	GND



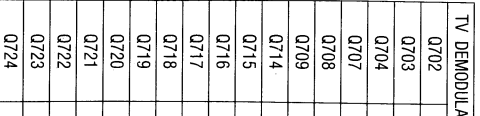
1

2

3

4

SP STOP MODE.



TRANSISTOR RANKS Q.R.ORS.
TRANSISTOR RANKS Q.R.ORS.

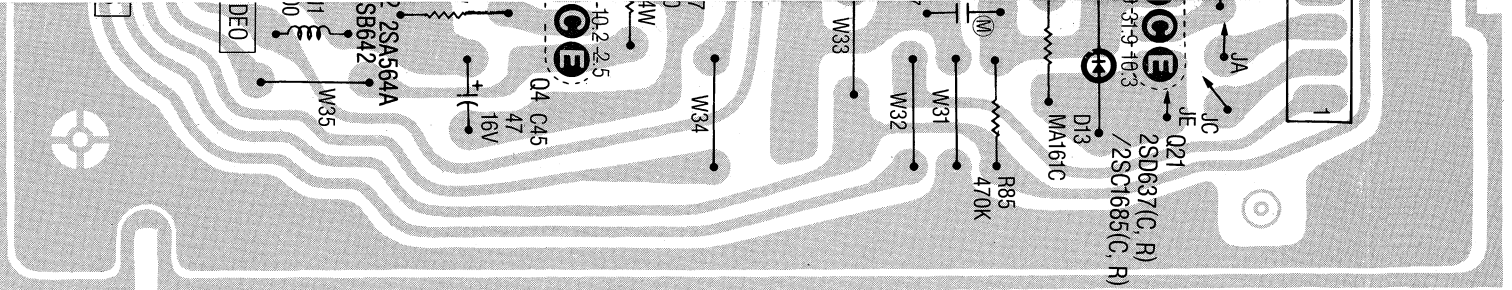
5	VIDEO
---	-------

J59	GND
-----	-----

4

9

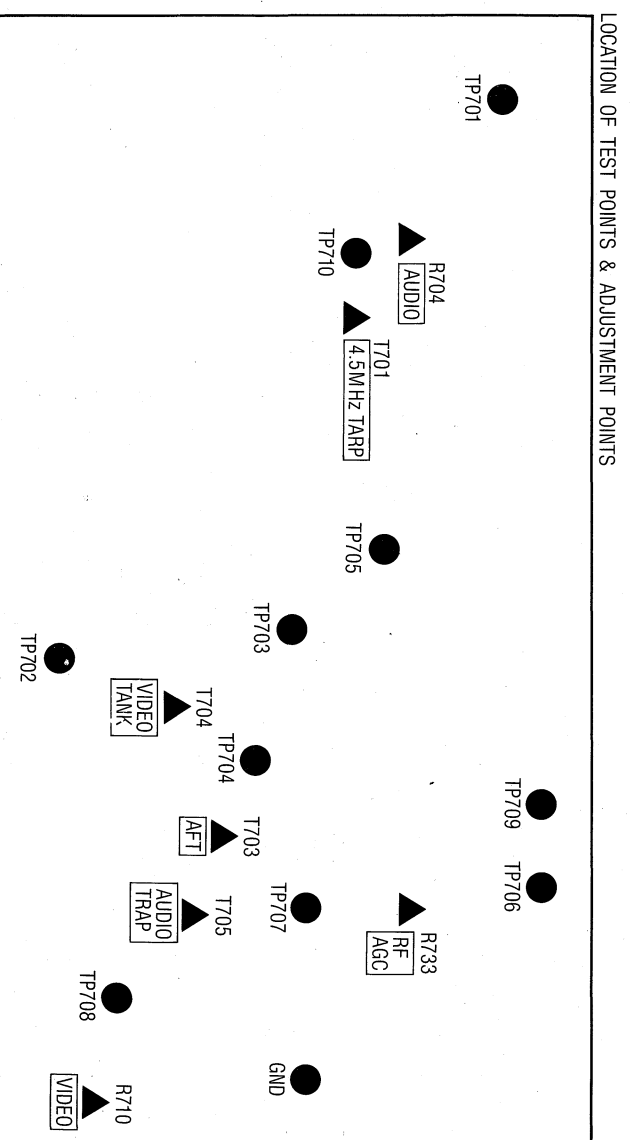
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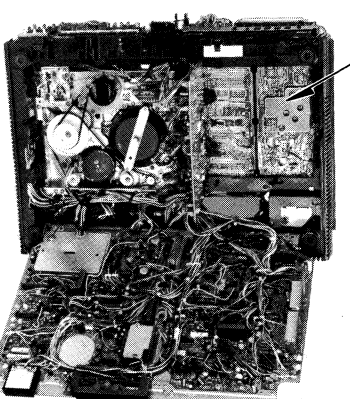
P716	
1	AUDIO
2	+9V
3	GND
4	GND
5	VIDEO

JUMPER	
J51	AFT
J53	AGC
J54	BT
J55	BM
J56	BV
J57	BU
J58	BS
J59	GND

TV DEMODULATOR C.B.A.	
0702	6-B
0703	6-B
0704	6-B
0707	4-B
0708	4-B
0709	3-B
0714	3-B
0715	6-D
0716	6-C
0717	5-D
0718	5-D
0719	6-C
0720	6-C
0721	6-C
0722	2-C
0723	2-C
0724	2-C



LOCATION OF TEST POINTS & ADJUSTMENT POINTS



TV DEMODULATOR C.B.A.

TV DEMODULATOR SCHEMATIC DIAGRAM

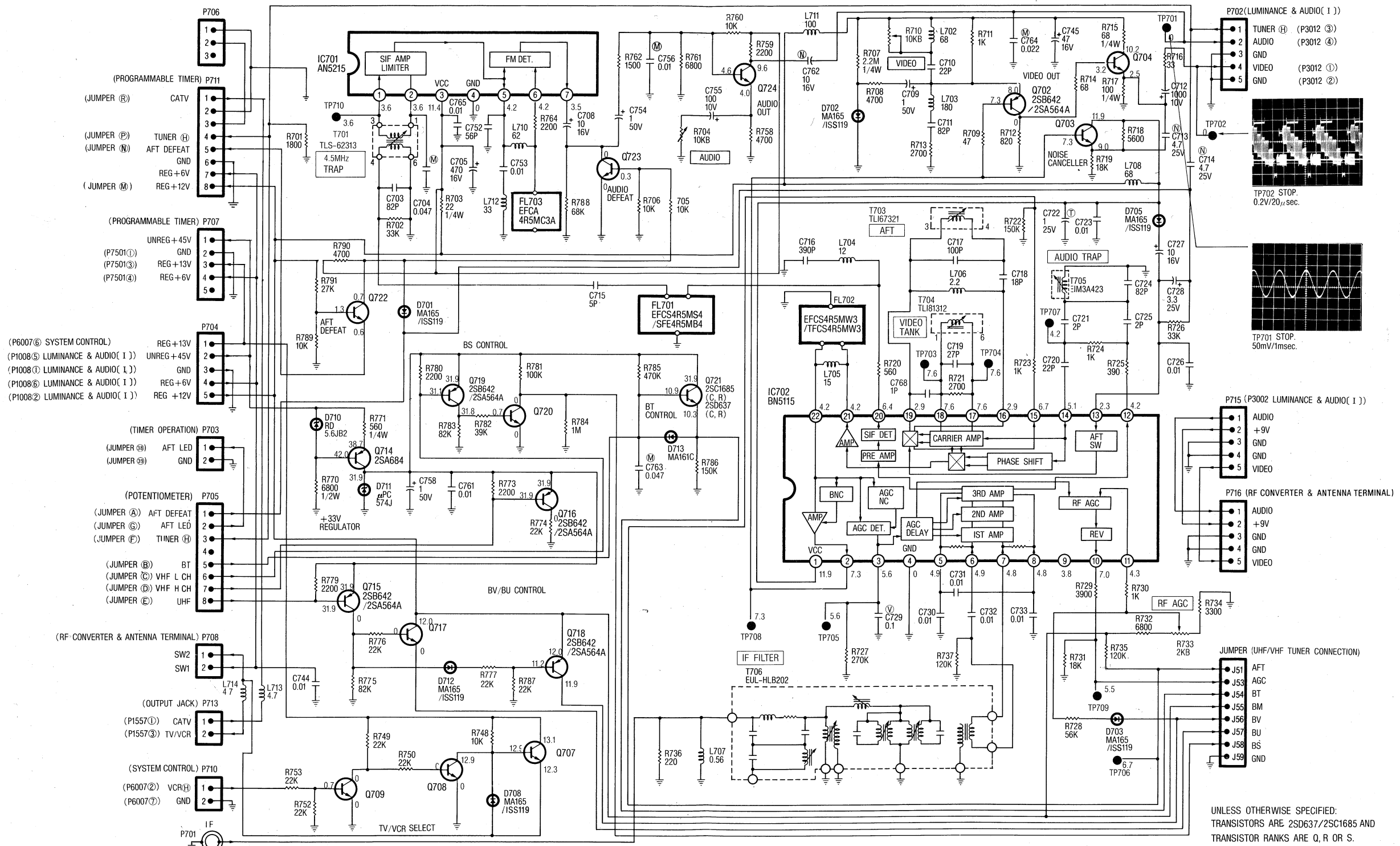
NOTE : REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.

EXAMPLE : C.B.A.....R2, REF. NO. 700

SERIES SCHEMATIC DIAGRAM.....

702 (702 IS ABBREVIATED
TO R2)

VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL IN
SP STOP MODE.



P701 (TV DEMO)		
PIN NO.	SIGNAL NAME	
	1F	UH

PIN NO.	SIGNAL NAME	
1	TUNER (H)	P3
2	AUDIO	P3
3	GND	P3
4	VIDEO	P3
5	GND	P7

P703 (TV DEM		
PIN NO.	SIGNAL NAME	
1	AFT LED	JUMP
2	GND	JUMP

P705 (TV DEMC)		
PIN NO.	SIGNAL NAME	
1	AFT DEFEAT	JUMPER-A UHF/
2	AFT LED	JUMPER-G UHF/
3	TUNER (H)	JUMPER-F UHF/
4		
5	BT	JUMPER-B UHF/
6	VHF H CH	JUMPER-C UHF/
7	VHF L CH	JUMPER-D UHF/
8	UHF	JUMPER-E UHF/

P707 (TV DEMO)		
PIN NO.	SIGNAL NAME	
1	REG+45V	P75
2	GND	
3	REG+6V	P75
4	REG+13V	P75
5		

P708 (TV DEMO)		
PIN NO.	SIGNAL NAME	
1	SW2	RF
2	SW1	RF

P710 (TV DEMO)		
PIN NO.	SIGNAL NAME	
1	VCR (H)	P6C
2	GND	P6C

P711 (TV DEMO)		
PIN NO.	SIGNAL NAME	
1	CATV	JUN
2		
3		
4	TUNER (H)	JUN
5	AFT DEFEAT	JUN
6	GND	
7	REG+6V	
8	REG+12V	JUN

P716 (TV DEMODULATOR C.B.A.)			
PIN NO.	SIGNAL NAME	DESTINATION	
1	AUDIO	RF CONVERTER & ANTENNA	TERMINAL C.B.A.
2	+ 9V	RF CONVERTER & ANTENNA	TERMINAL C.B.A.
3	GND	RF CONVERTER & ANTENNA	TERMINAL C.B.A.
4	GND	RF CONVERTER & ANTENNA	TERMINAL C.B.A.
5	VIDEO	RF CONVERTER & ANTENNA	TERMINAL C.B.A.

4-18 ONE TOUCH RECORDING

ONE TOUCH RECORDING SCHEMATIC DIAGRAM

NOTE : REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.

EXAMPLE : C.B.A.....R2, REF. NO. 7600

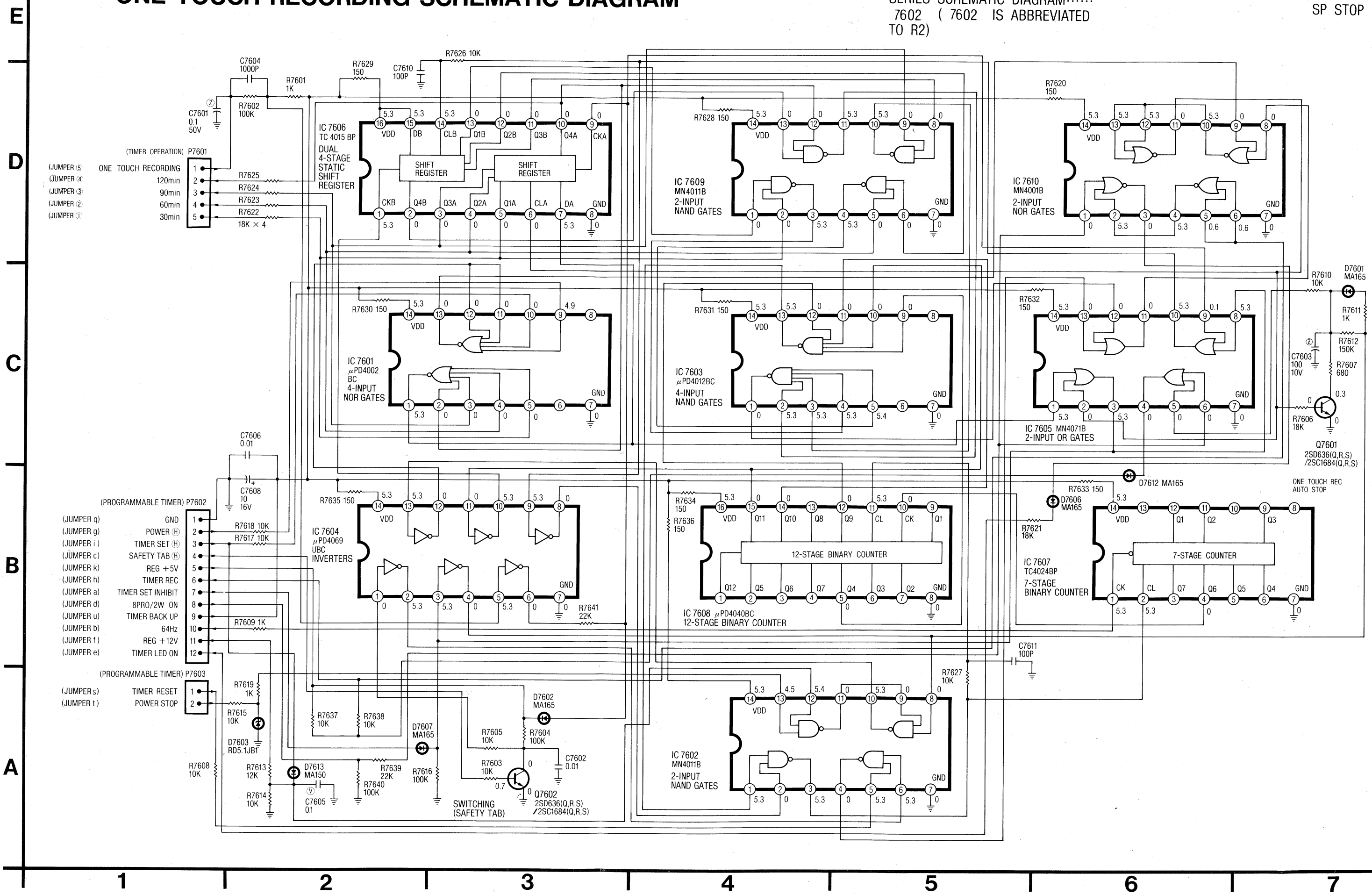
SERIES SCHEMATIC DIAGRAM.....

7602 (7602 IS ABBREVIATED

TO R2)

VOLTAGE MEASUREMENTS : COLOR BAR SIG

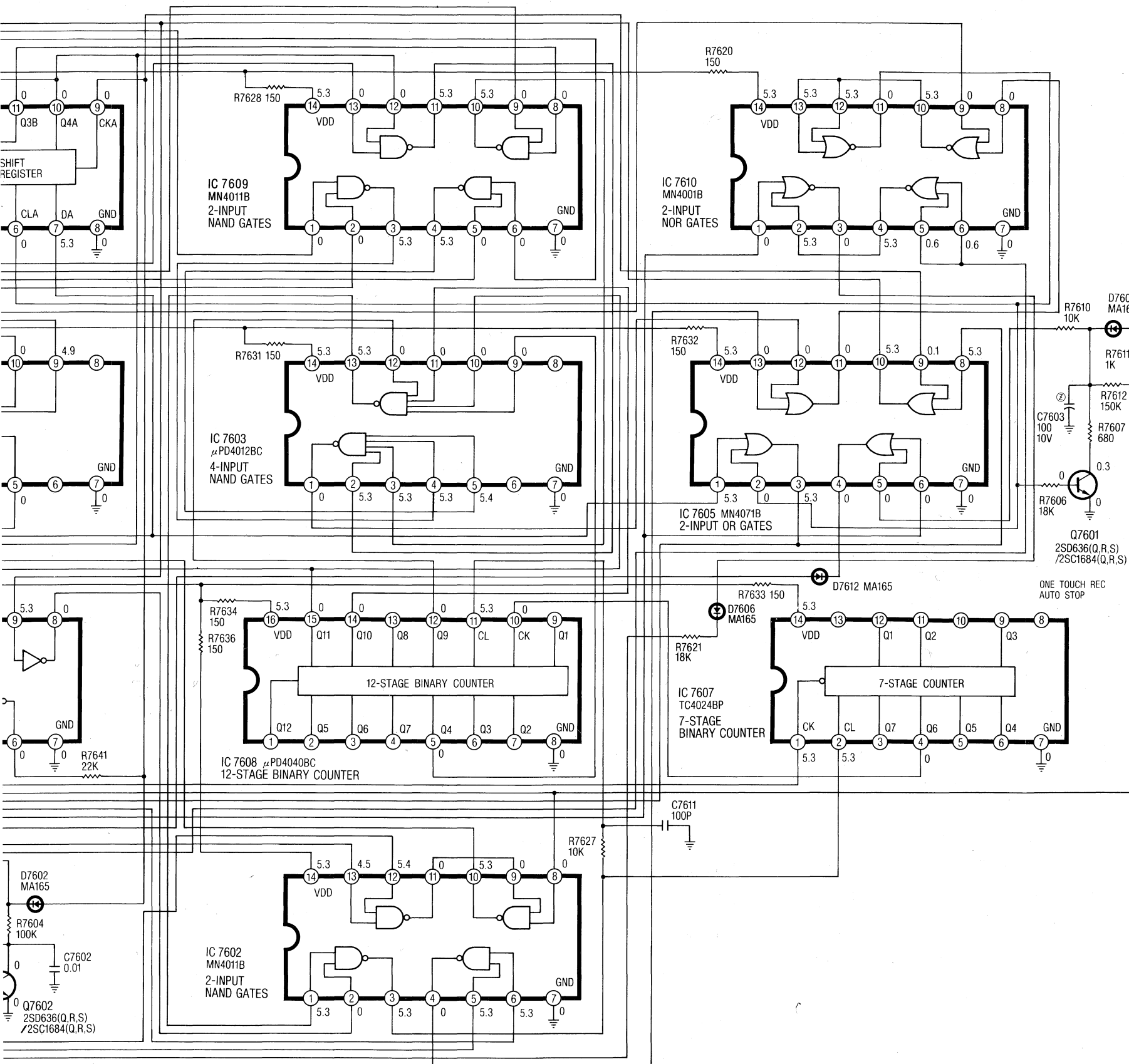
SP STOP MODE.



TIC DIAGRAM

NOTE : REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
EXAMPLE : C.B.A.....R2, REF. NO. 7600
SERIES SCHEMATIC DIAGRAM.....
7602 (7602 IS ABBREVIATED
TO R2)

VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL IN
SP STOP MODE.



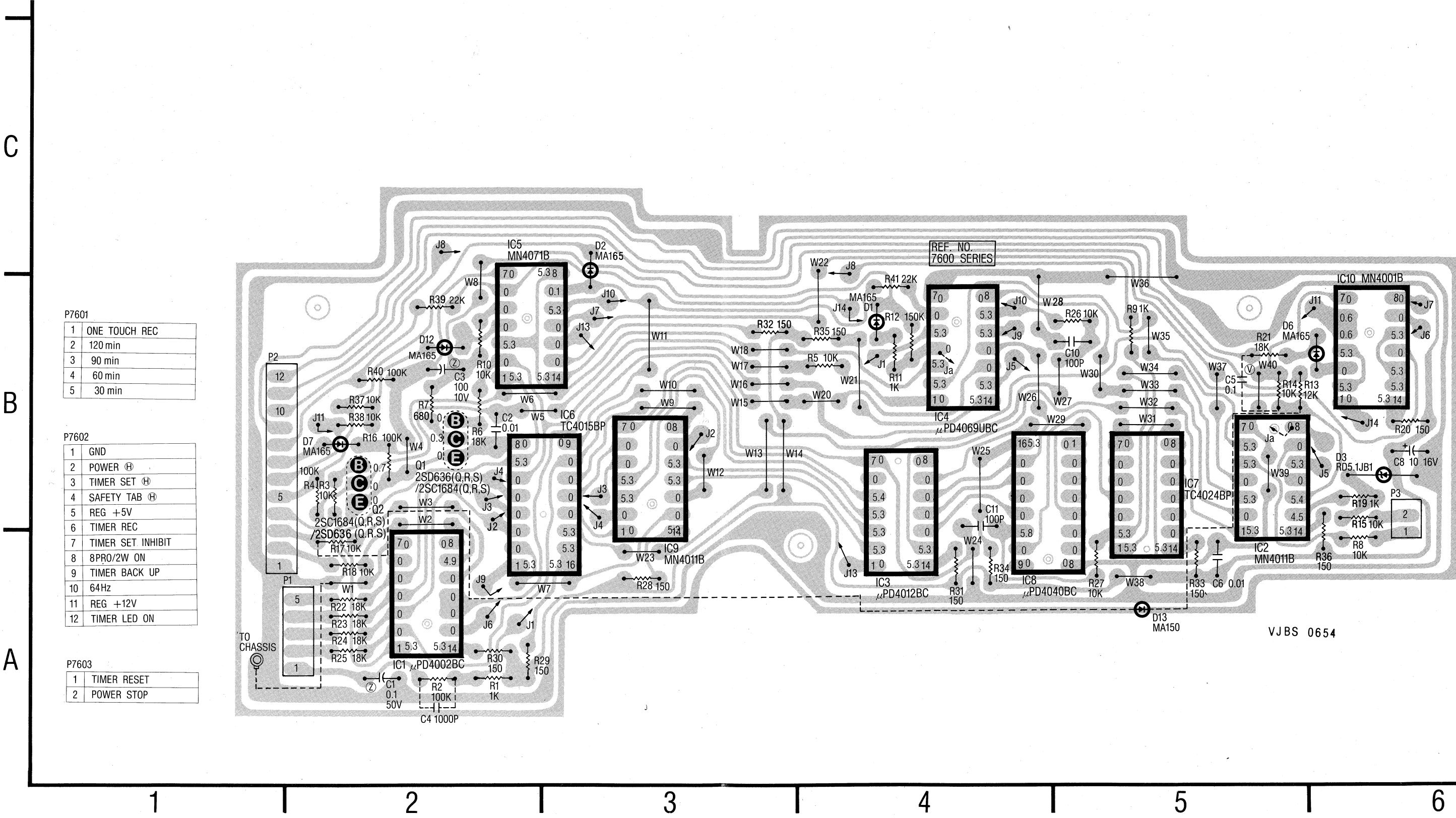
P7601 (ONE TOUCH RECORDING C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	ONE TOUCH RECORDING	JUMPER-5 TIMER OPERATION C.B.A.
2	120min	JUMPER-4 TIMER OPERATION C.B.A.
3	90min	JUMPER-3 TIMER OPERATION C.B.A.
4	60min	JUMPER-2 TIMER OPERATION C.B.A.
5	30min	JUMPER-1 TIMER OPERATION C.B.A.

P7602 (ONE TOUCH RECORDING C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	GND	JUMPER q PROGRAMMABLE TIMER C.B.A.
2	POWER Ⓜ	JUMPER g PROGRAMMABLE TIMER C.B.A.
3	TIMER SET Ⓜ	JUMPER i PROGRAMMABLE TIMER C.B.A.
4	SAFETY TAB Ⓜ	JUMPER c PROGRAMMABLE TIMER C.B.A.
5	REG +5V	JUMPER k PROGRAMMABLE TIMER C.B.A.
6	TIMER REC	JUMPER h PROGRAMMABLE TIMER C.B.A.
7	TIMER SET INHIBIT	JUMPER a PROGRAMMABLE TIMER C.B.A.
8	8PRO/2W ON	JUMPER d PROGRAMMABLE TIMER C.B.A.
9	TIMER BACK UP	JUMPER u PROGRAMMABLE TIMER C.B.A.
10	64Hz	JUMPER b PROGRAMMABLE TIMER C.B.A.
11	REG +12V	JUMPER f PROGRAMMABLE TIMER C.B.A.
12	TIMER LED ON	JUMPER e PROGRAMMABLE TIMER C.B.A.

P7603 (ONE TOUCH RECORDING C.B.A.)		
PIN NO.	SIGNAL NAME	DESTINATION
1	TIMER RESET	JUMPER s PROGRAMMABLE TIMER C.B.A.
2	POWER STOP	JUMPER t PROGRAMMABLE TIMER C.B.A.

ONE TOUCH RECORDING C.B.A VEPS0654A

VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL IN
SP STOP MODE.



P7601

1	ONE TOUCH REC
2	120 min
3	90 min
4	60 min
5	30 min

P7602

1	GND
2	POWER ⊕
3	TIMER SET ⊕
4	SAFETY TAB ⊕
5	REG +5V
6	TIMER REC
7	TIMER SET INHIBIT
8	8PRO/2W ON
9	TIMER BACK UP
10	64Hz
11	REG +12V
12	TIMER LED ON

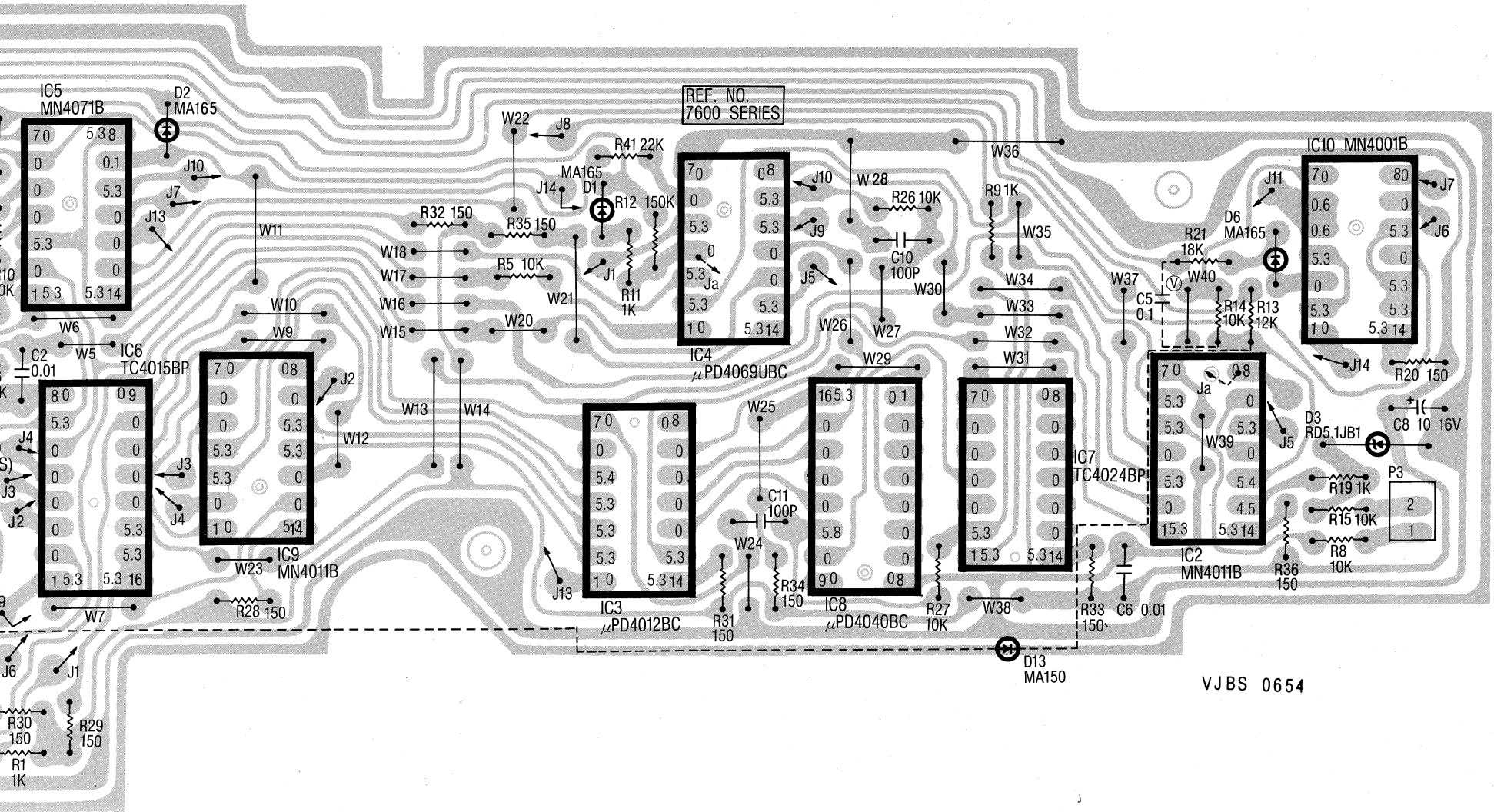
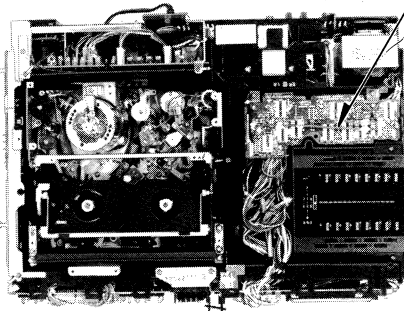
P7603

1	TIMER RESET
2	POWER STOP

C.B.A VEPS0654A

VOLTAGE MEASUREMENTS : COLOR BAR SIGNAL IN
SP STOP MODE.

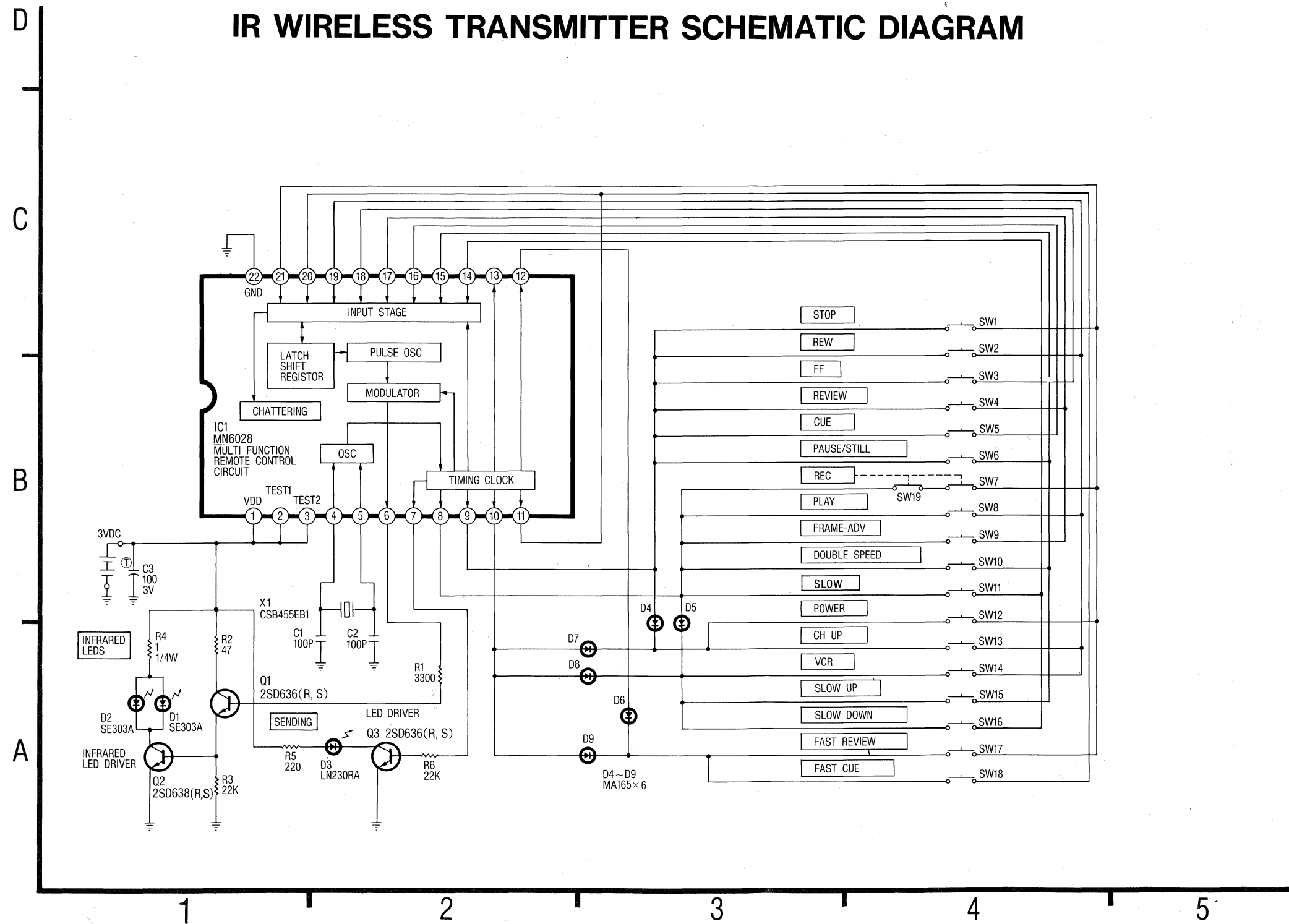
ONE TOUCH RECORDING C.B.A.



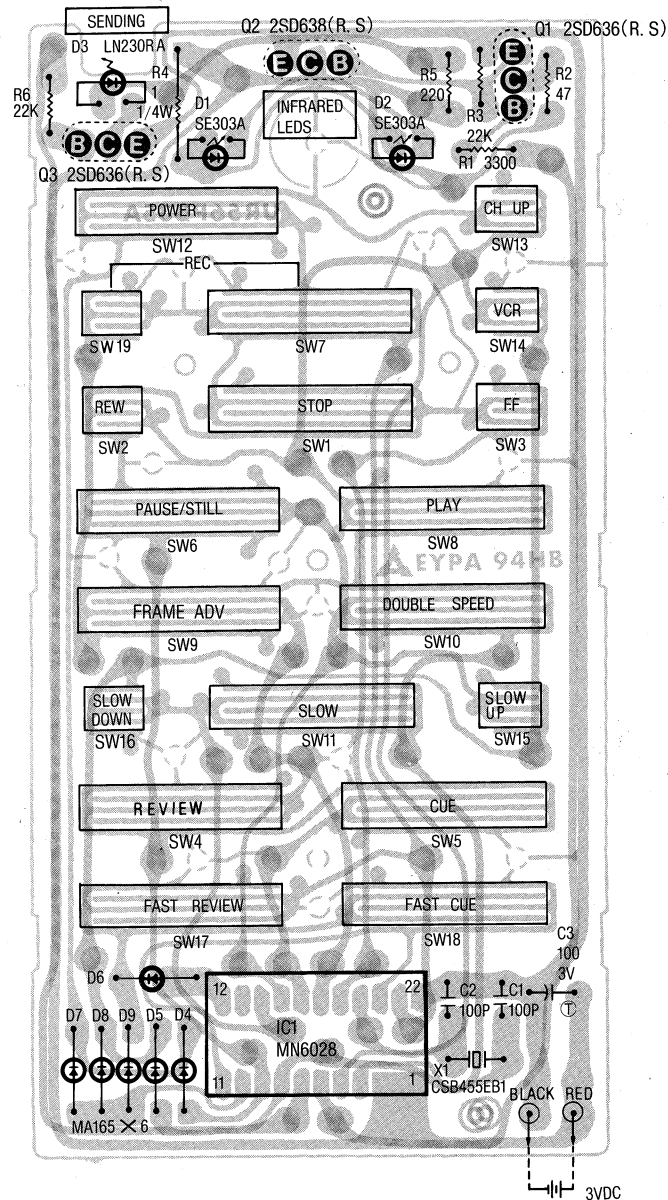
ONE TOUCH RECORDING C.B.A.	
Q1	2-B
Q2	2-B



IR WIRELESS TRANSMITTER SCHEMATIC DIAGRAM

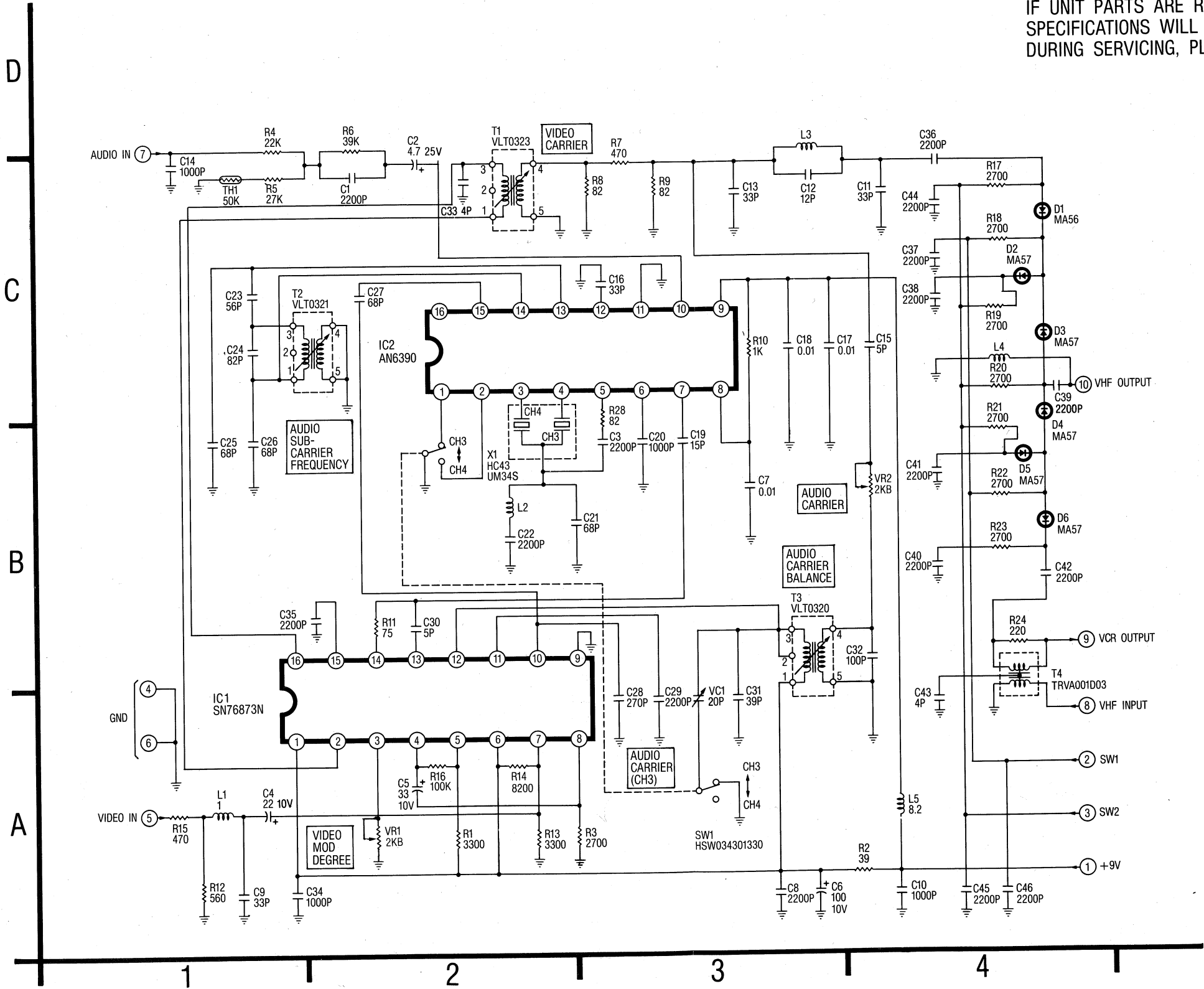


IR WIRELESS TRANSMITTER UNIT

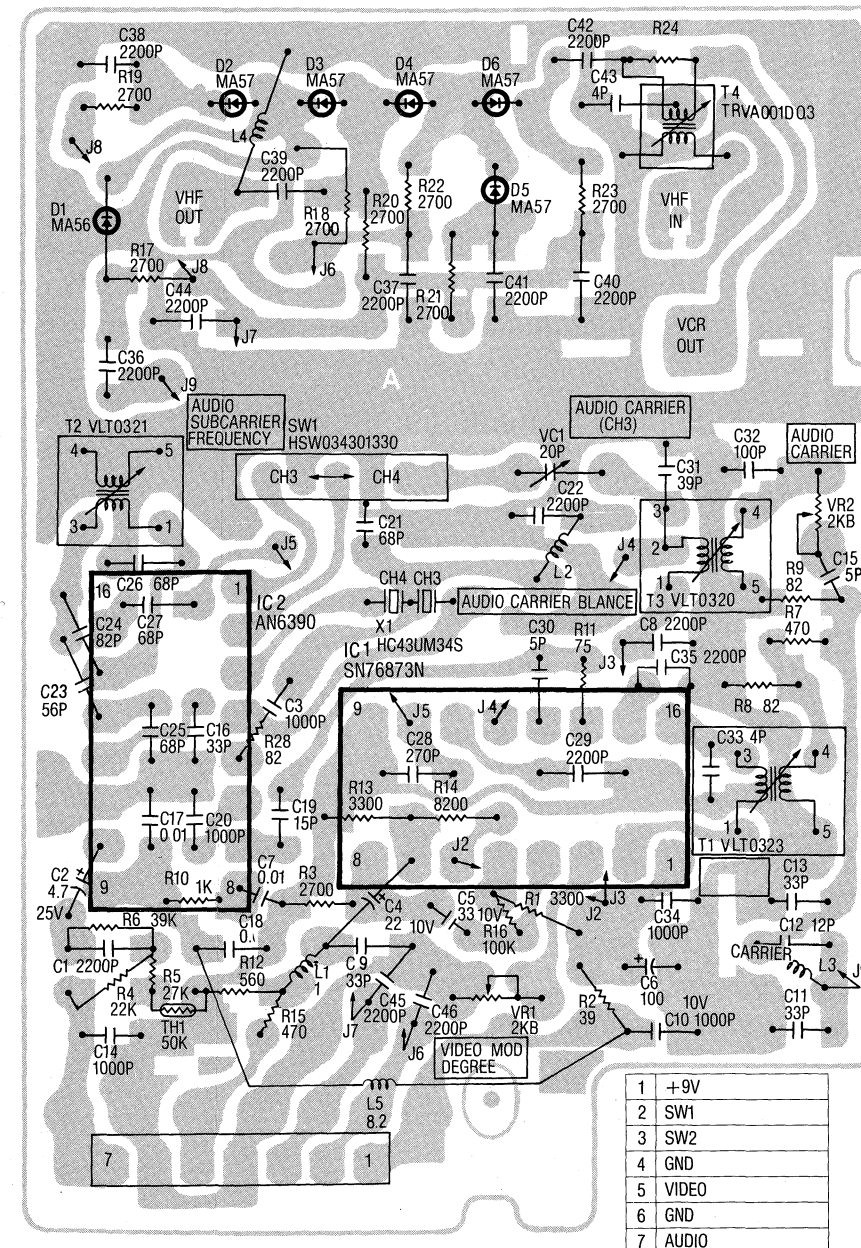


RF CONVERTER & ANTENNA TERMINAL SCHEMATIC DIAGRAM ENC86502

IMPORTANT NOTICE :
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC
SPECIFICATIONS WILL NOT BE SATISFIED.
DURING SERVICING, PLEASE REPLACE AS A UNIT.

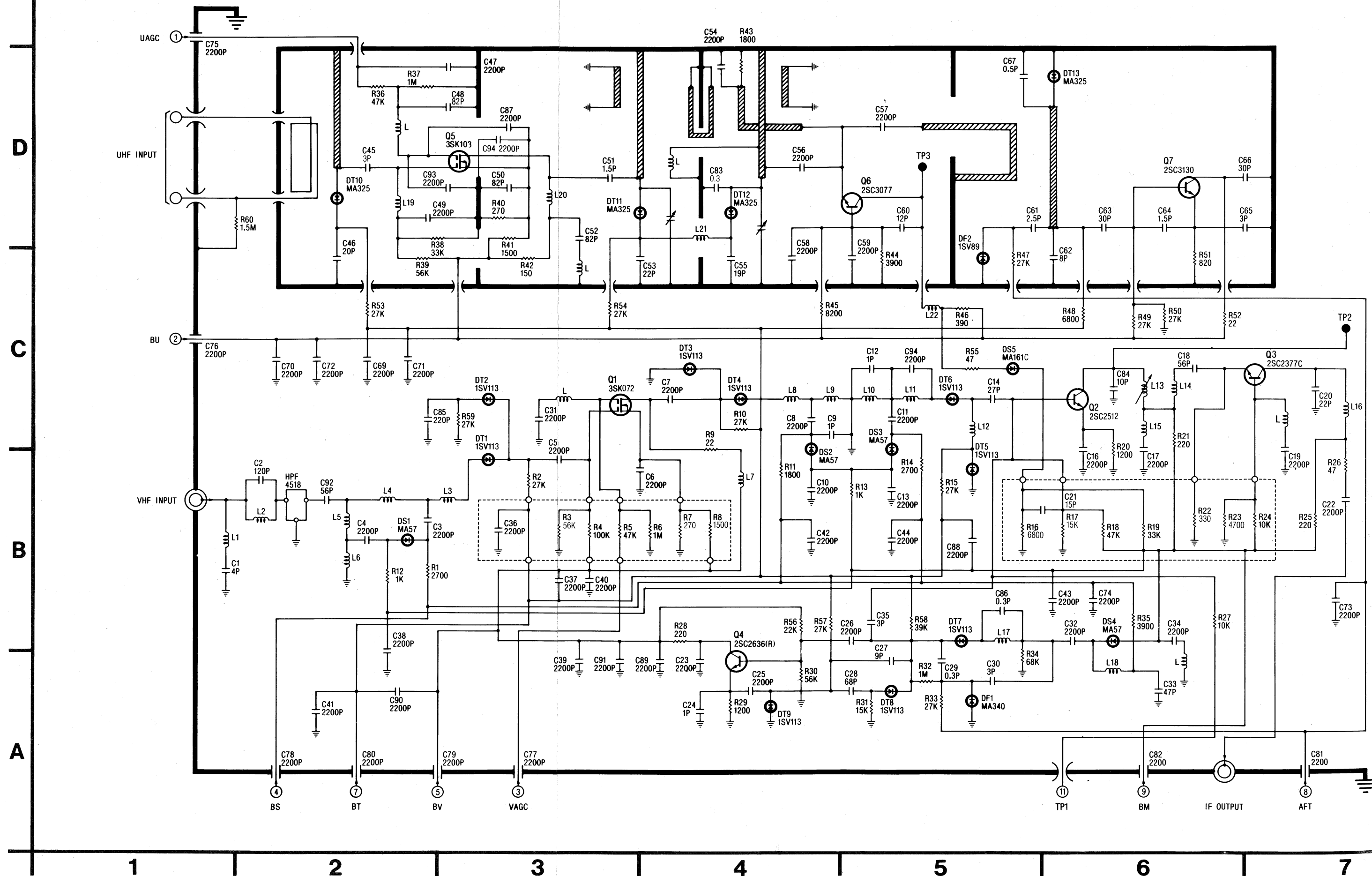


RF CONVERTER & ANTENNA TERMINAL UNIT ENC86502

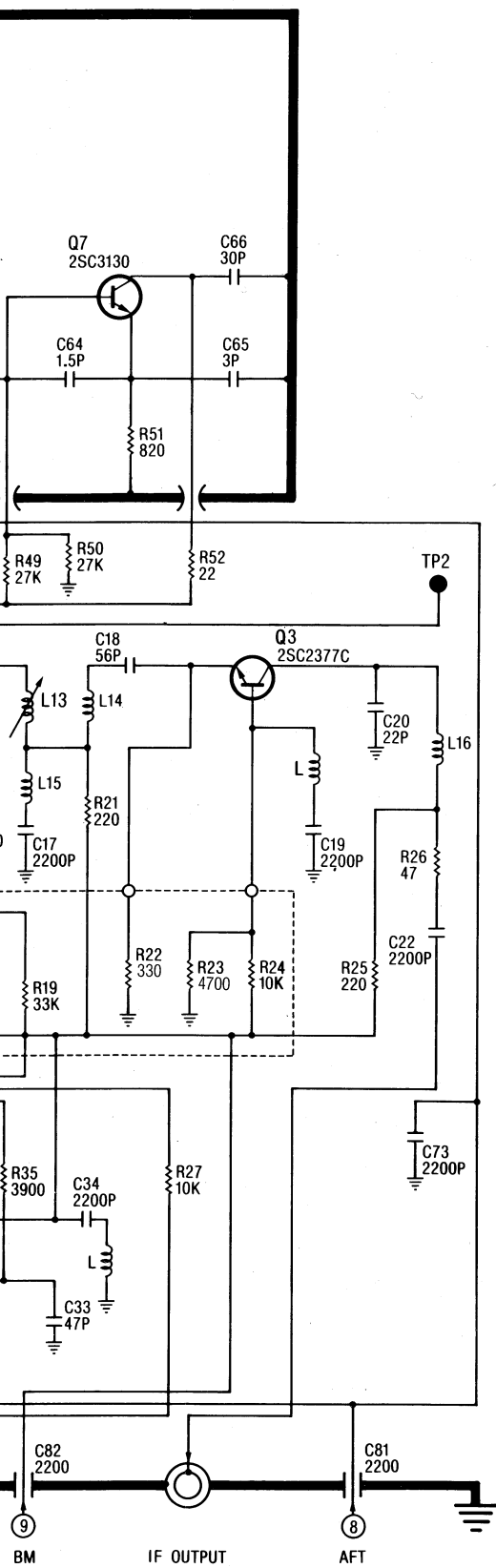


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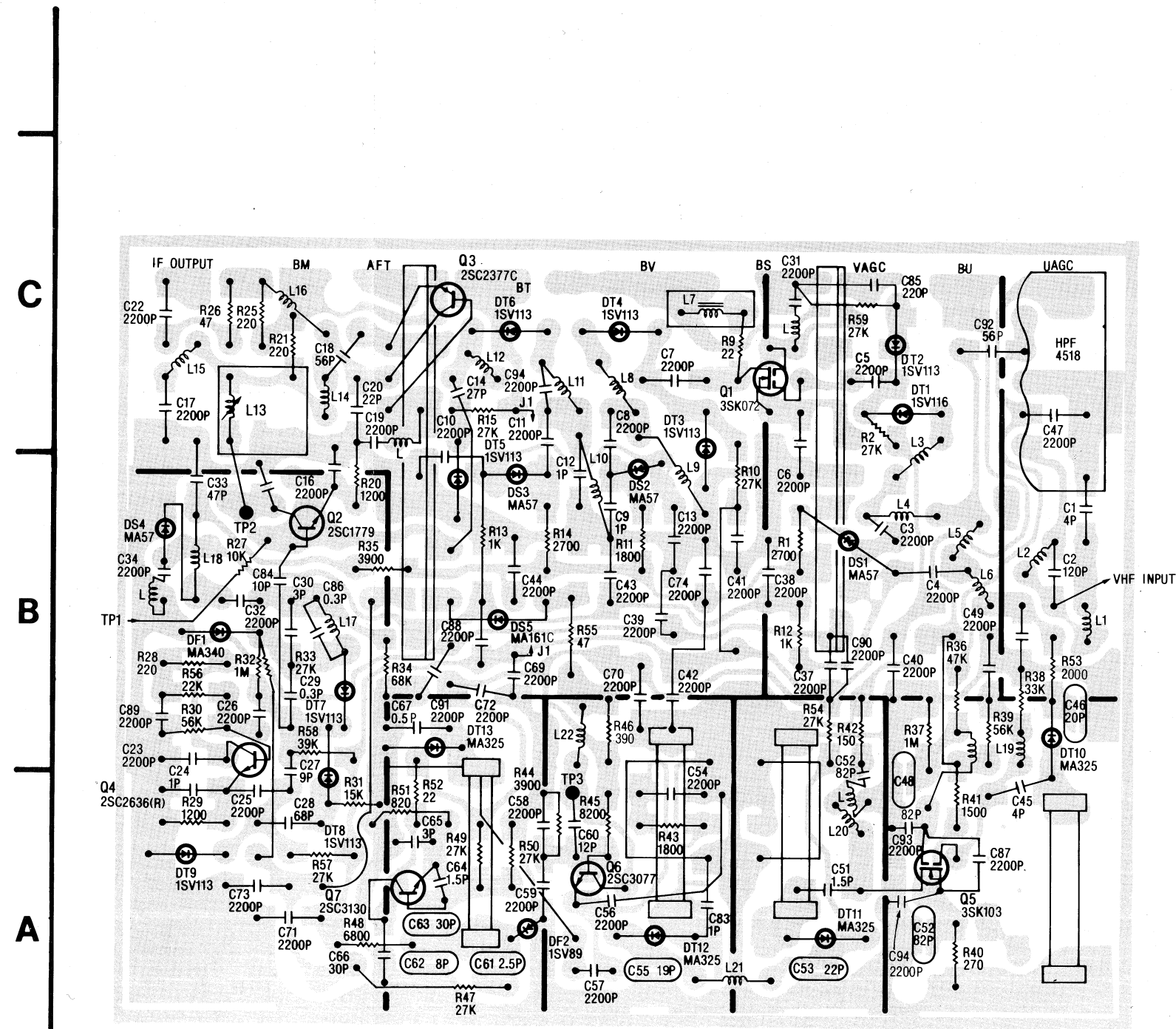


CE :
ARE REPLACED INDIVIDUALLY, THE FCC
WILL NOT BE SATISFIED.
ING, PLEASE REPLACE AS A UNIT.



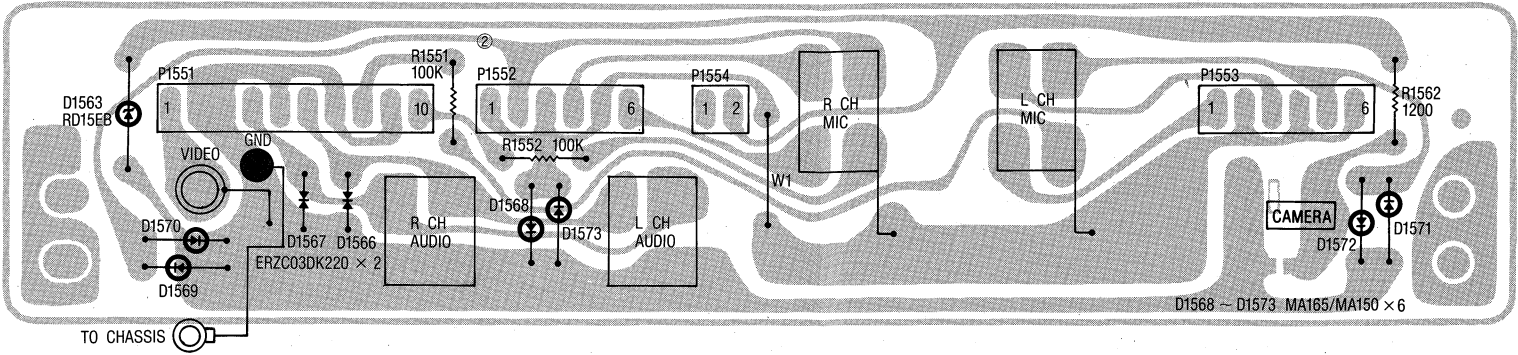
UHF/VHF TUNER UNIT	
Q1	C - 3
Q2	B - 1
Q3	C - 2
Q4	B - 1
Q5	A - 3
Q6	A - 2
Q7	A - 2

UHF/VHF TUNER UNIT TNV56753F2



IMPORTANT NOTICE :
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC
SPECIFICATIONS WILL NOT BE SATISFIED.
DURING SERVICING, PLEASE REPLACE AS A UNIT.

INPUT JACK C.B.A. VEKS0866



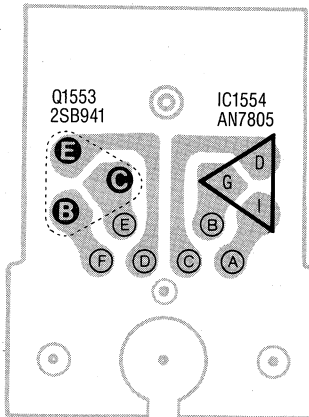
P1551
1 VIDEO
2 GND
3 GND
4 AUDIO R CH
5 GND
6 AUDIO L CH
7 GND
8 AUDIO L CH
9 GND
10 AUDIO R CH

P1552
1 GND
2 MIC L CH
3 GND
4 MIC L CH
5 GND
6 LINE L CH

P1553
1 LINE R CH
2 GND
3 MIC R CH
4 GND
5 MIC R CH
6 GND

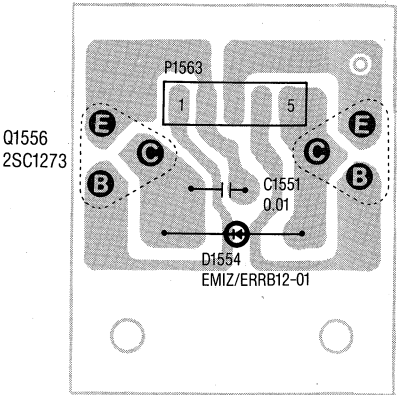
P1554
1
2 CAMERA PAUSE

POWER TRANSISTOR (I) C.B.A.
VEKS0875



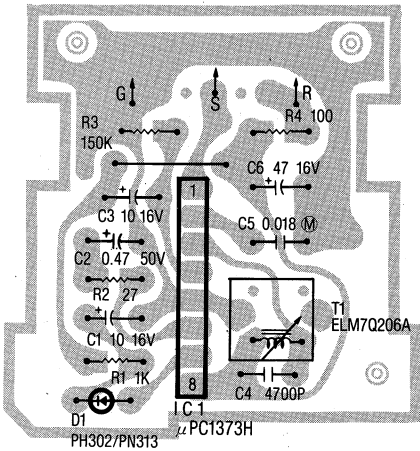
TO POWER
SUPPLY C. B. A.
A-P1004 ①
B-P1004 ②
C-P1004 ③
D-P1009 ②
E-P1009 ①
F-P1009 ③

POWER TRANSISTOR (II) C.B.A.
VEKS0862



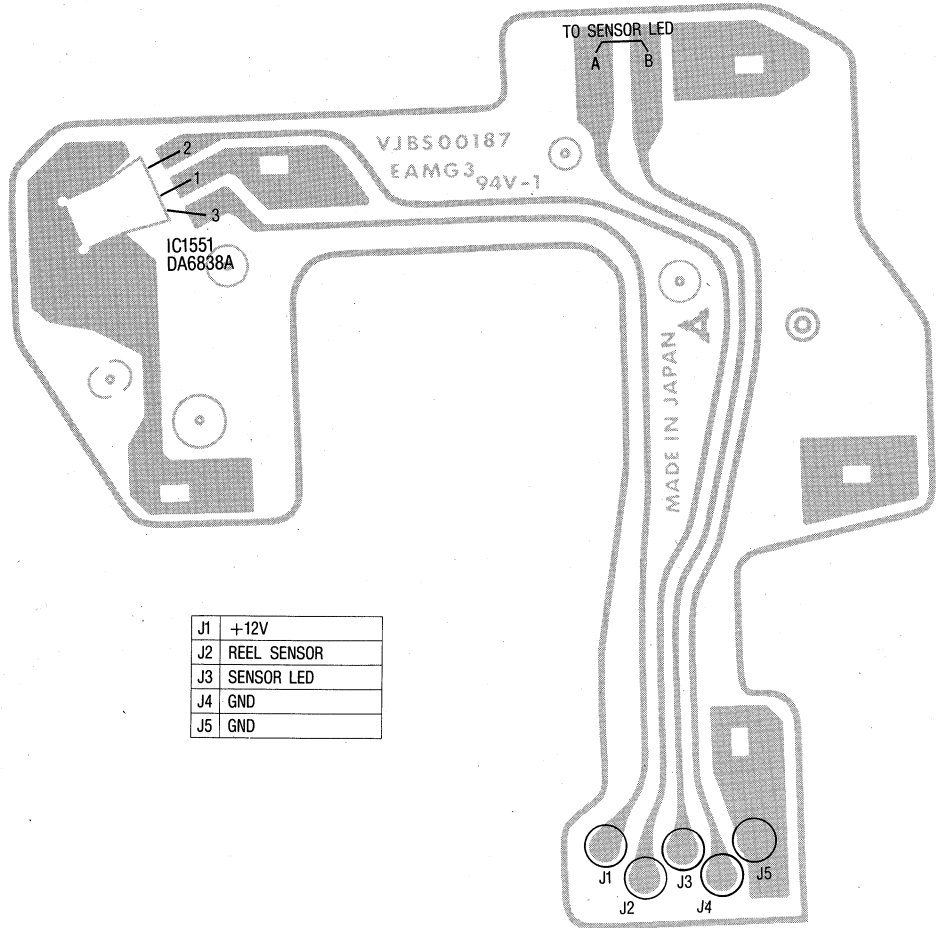
Q1555 2SD1315
P1563
1 POWER TR Q1556E
2 POWER TR Q1556B
3 POWER TR Q1555E
4 POWER TR Q1555B
5 UNREG +19V

REMOTE RECEIVING DETECTOR UNIT



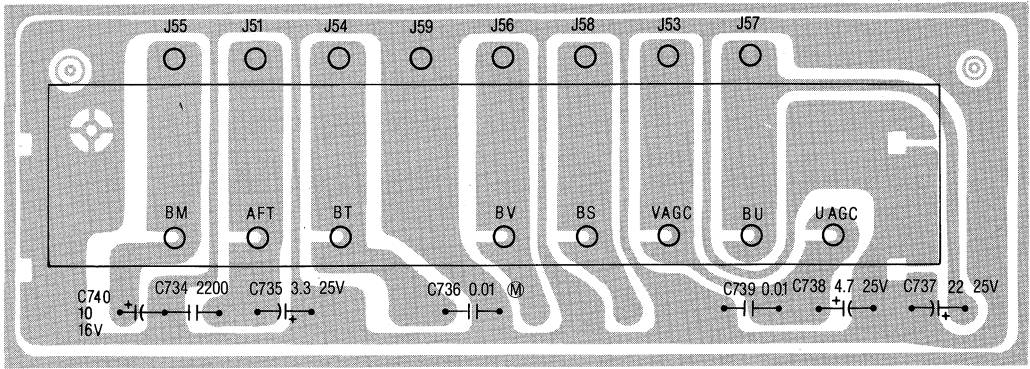
TO SYSTEM CONTROL C.B.A.
G - P6018 ②
R - P6018 ①
S - P6018 ③

REEL SENSOR C.B.A. VUPS0008

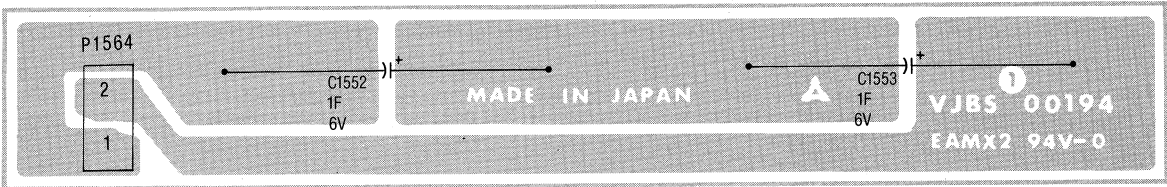


J1	+12V
J2	REEL SENSOR
J3	SENSOR LED
J4	GND
J5	GND

UHF/VHF TUNER CONNECTION C.B.A. VEPS0746A

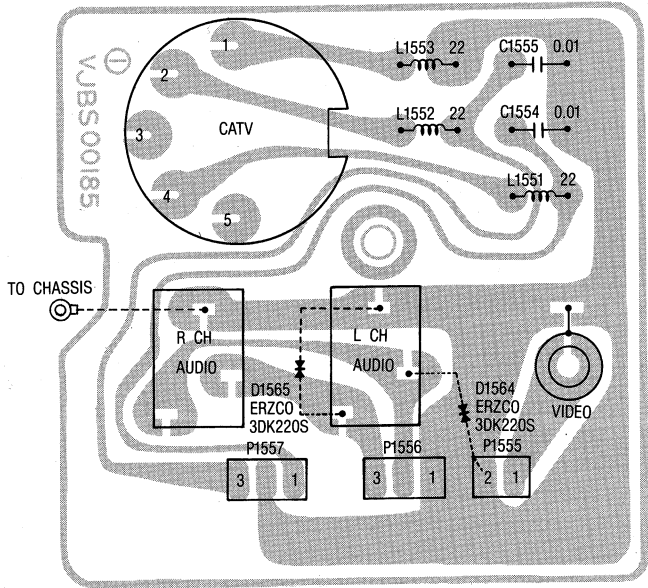


BACKUP CAPACITOR C.B.A. VEKS0876



P1564	
1	GND
2	BACK UP ⊕

OUTPUT JACK C.B.A. VEKS0873

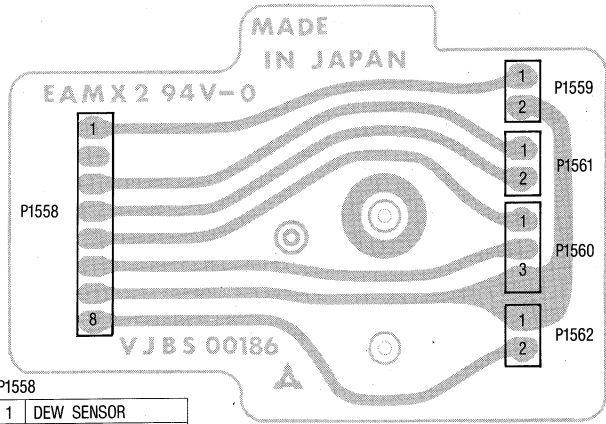


P1555	
1	VIDEO
2	GND

P1556	
1	GND
2	AUDIO L CH
3	AUDIO R CH

P1557	
1	CATV
2	GND
3	TV/VCR

CONNECTION C.B.A.



P1558	
1	DEW SENSOR
2	GND
3	REG +12V
4	CUE SENSOR TAPE S
5	LOADING M POSI
6	LOADING M NEGA
7	
8	TAKEUP PHOTO TR

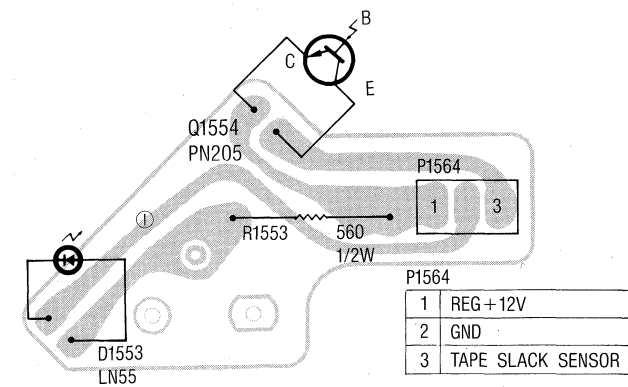
P1562	
1	GND
2	DEW SENSOR

P1559	
1	TAKEUP PHOTO TR
2	GND

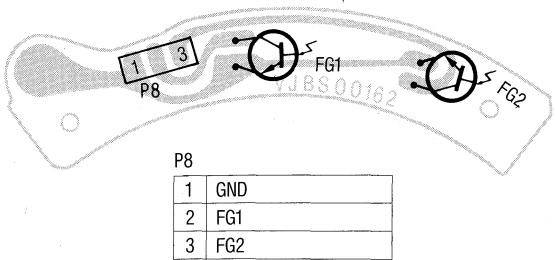
P1560	
1	LOADING M NEGA
2	LOADING M POSI

P1561	
1	CUE SENSOR
2	REG +12V
3	GND

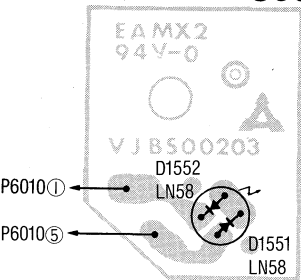
TAPE SLACK SENSOR C.B.A. VXKS0270



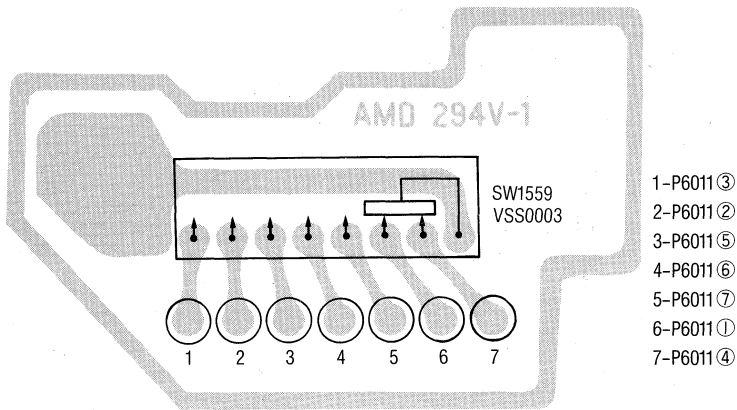
CAPSTAN FG C.B.A.



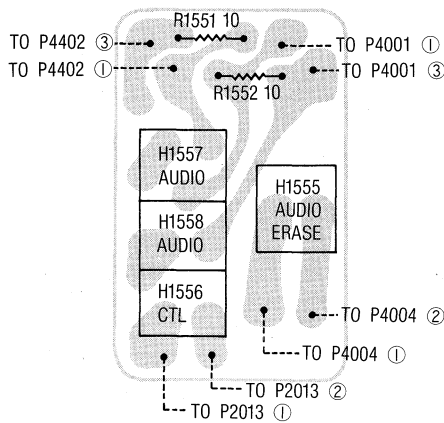
SENSOR LED C.B.A. VEKS0827



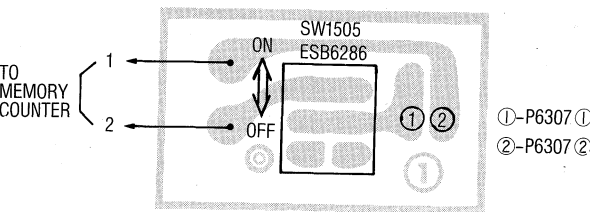
MODE SELECT SWITCH C.B.A.



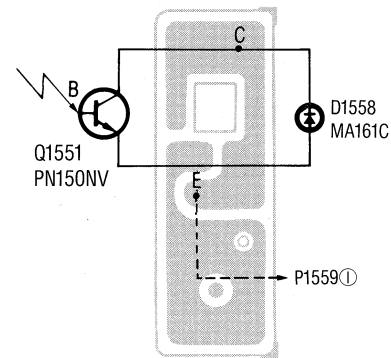
AUDIO/CONTROL HEAD C.B.A.



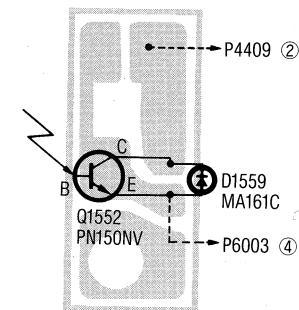
MEMORY SWITCH C.B.A.



TAKEUP PHOTO TR C.B.A.
VUPS0009

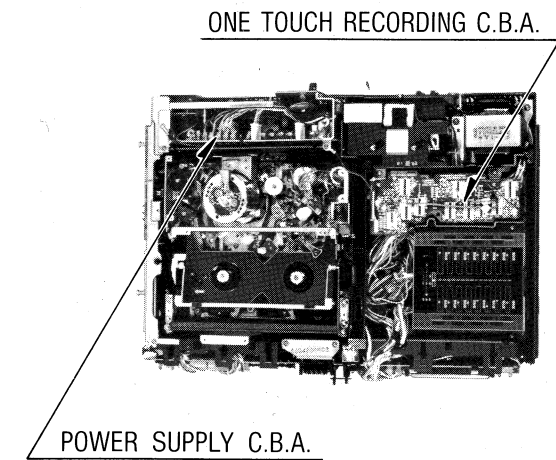


SUPPLY PHOTO TR C.B.A.
VUPS0010

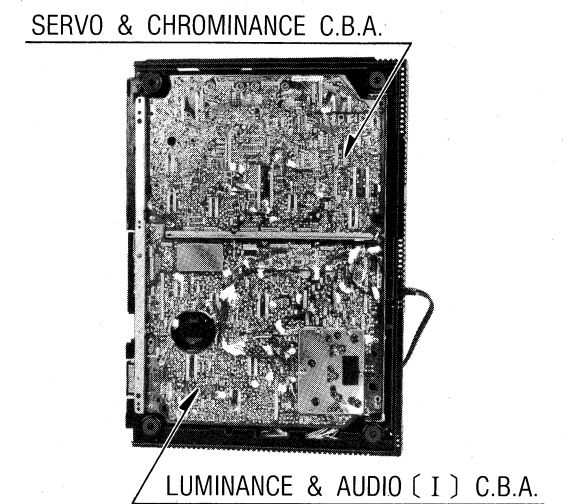


CIRCUIT BOARD LAYOUT

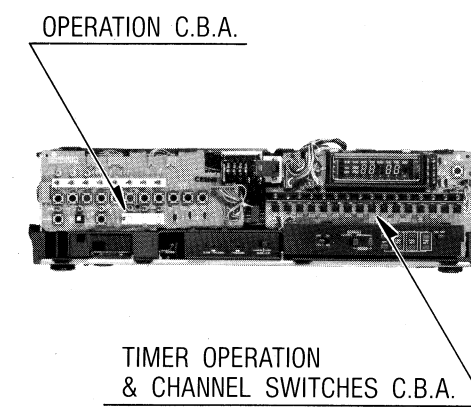
TOP VIEW



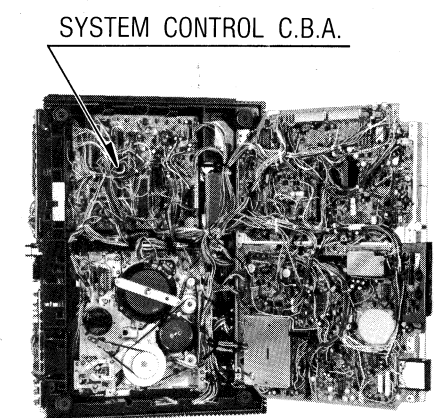
BOTTOM VIEW [I]



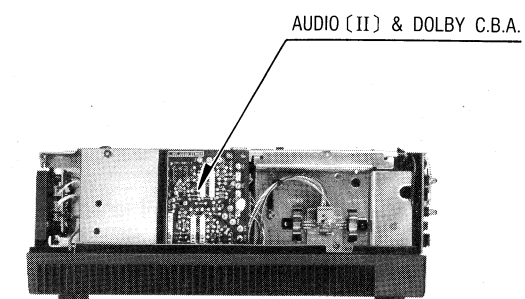
FRONT VIEW



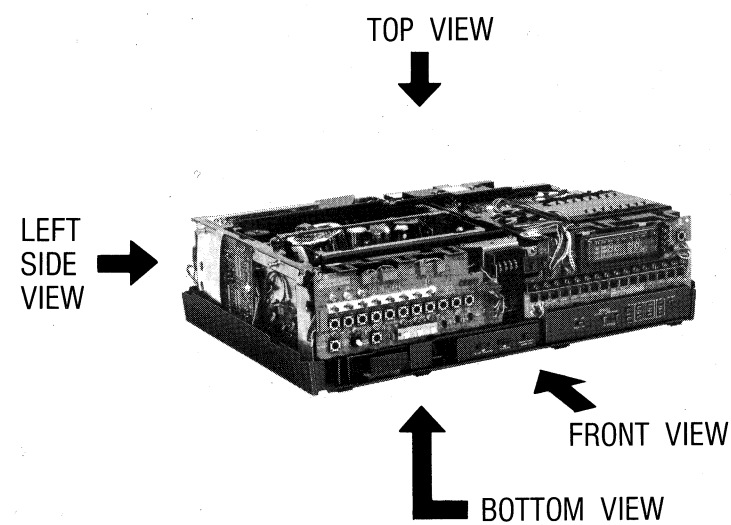
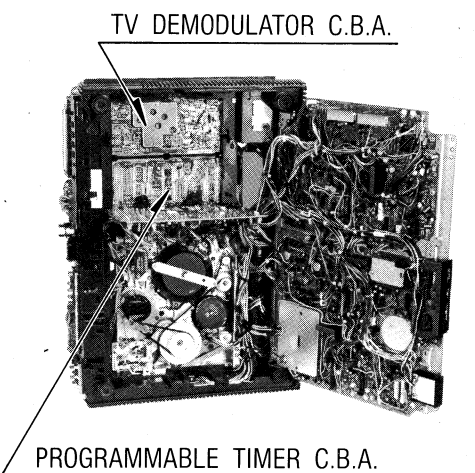
BOTTOM VIEW [II]



LEFT SIDE VIEW



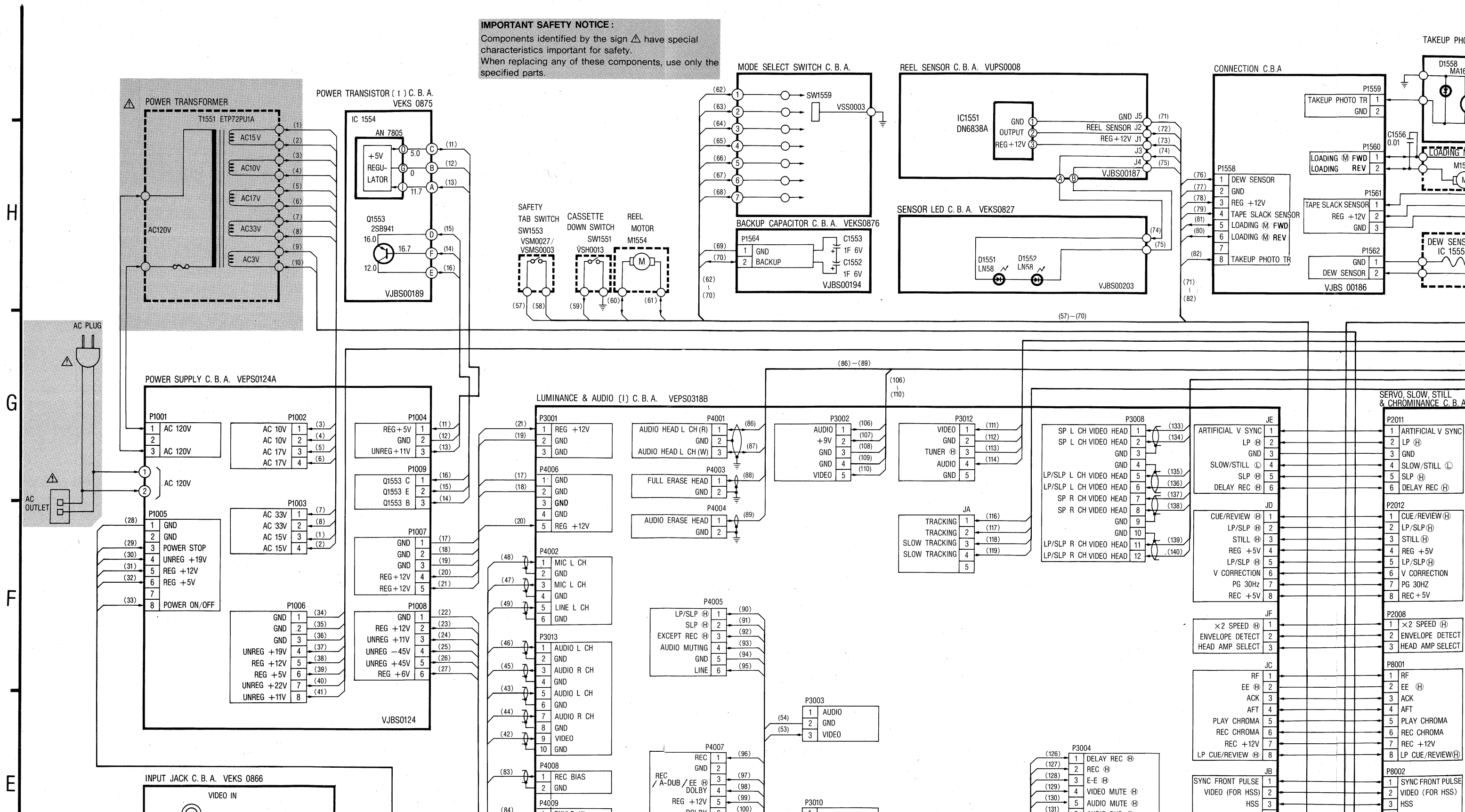
BOTTOM VIEW [III]

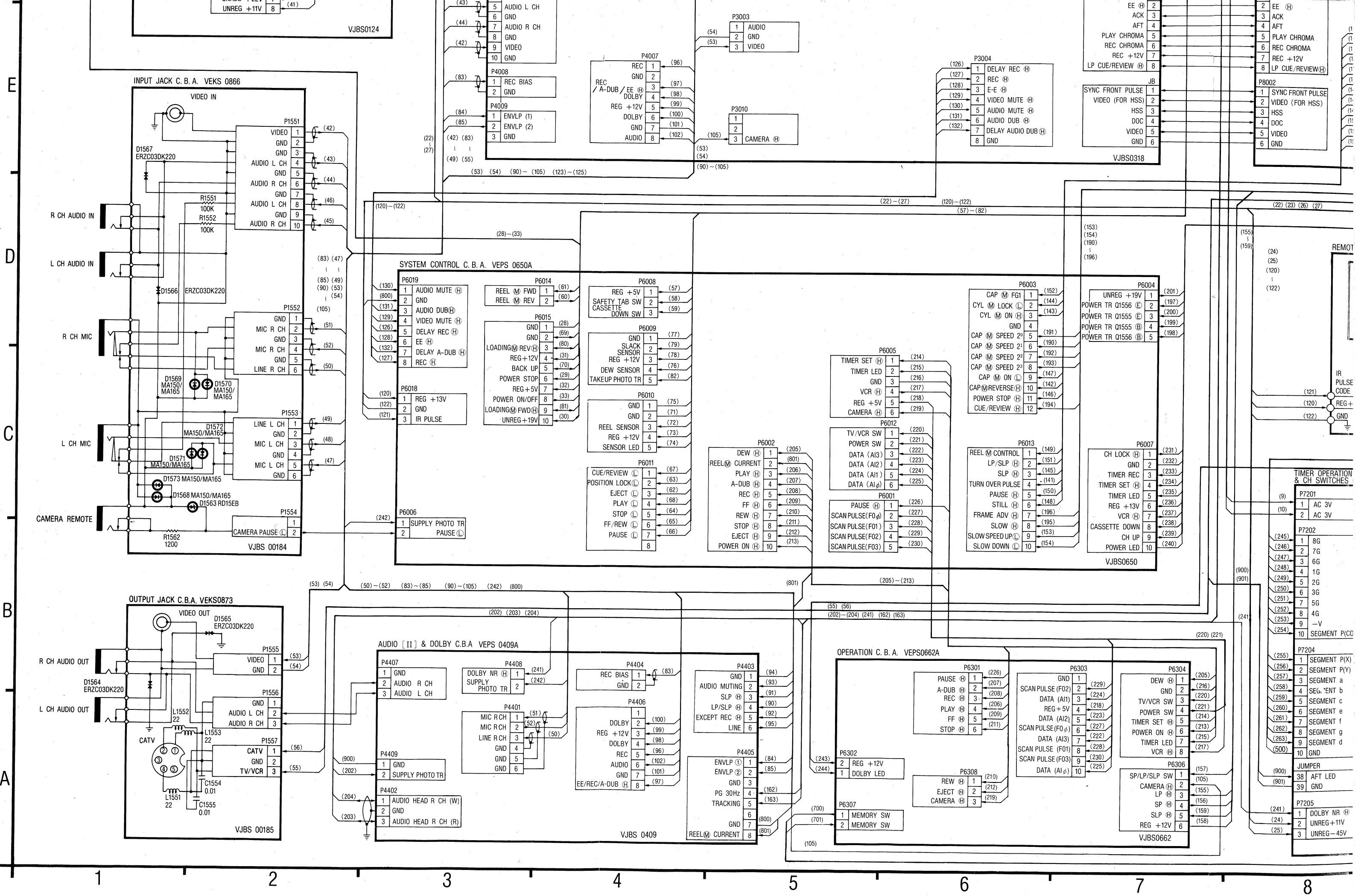


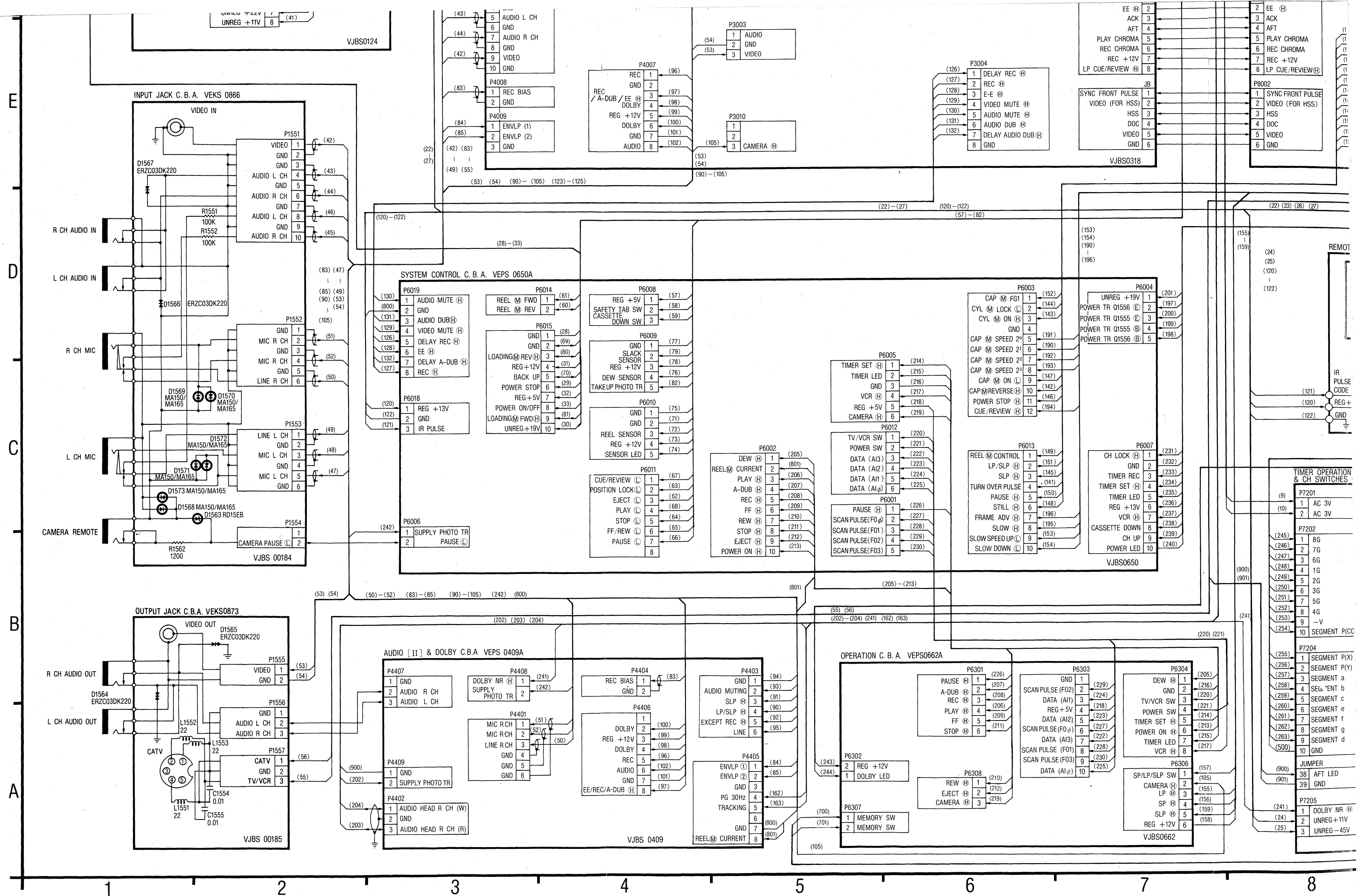
INTERCONNECTION SCHEMATIC DIAGRAM

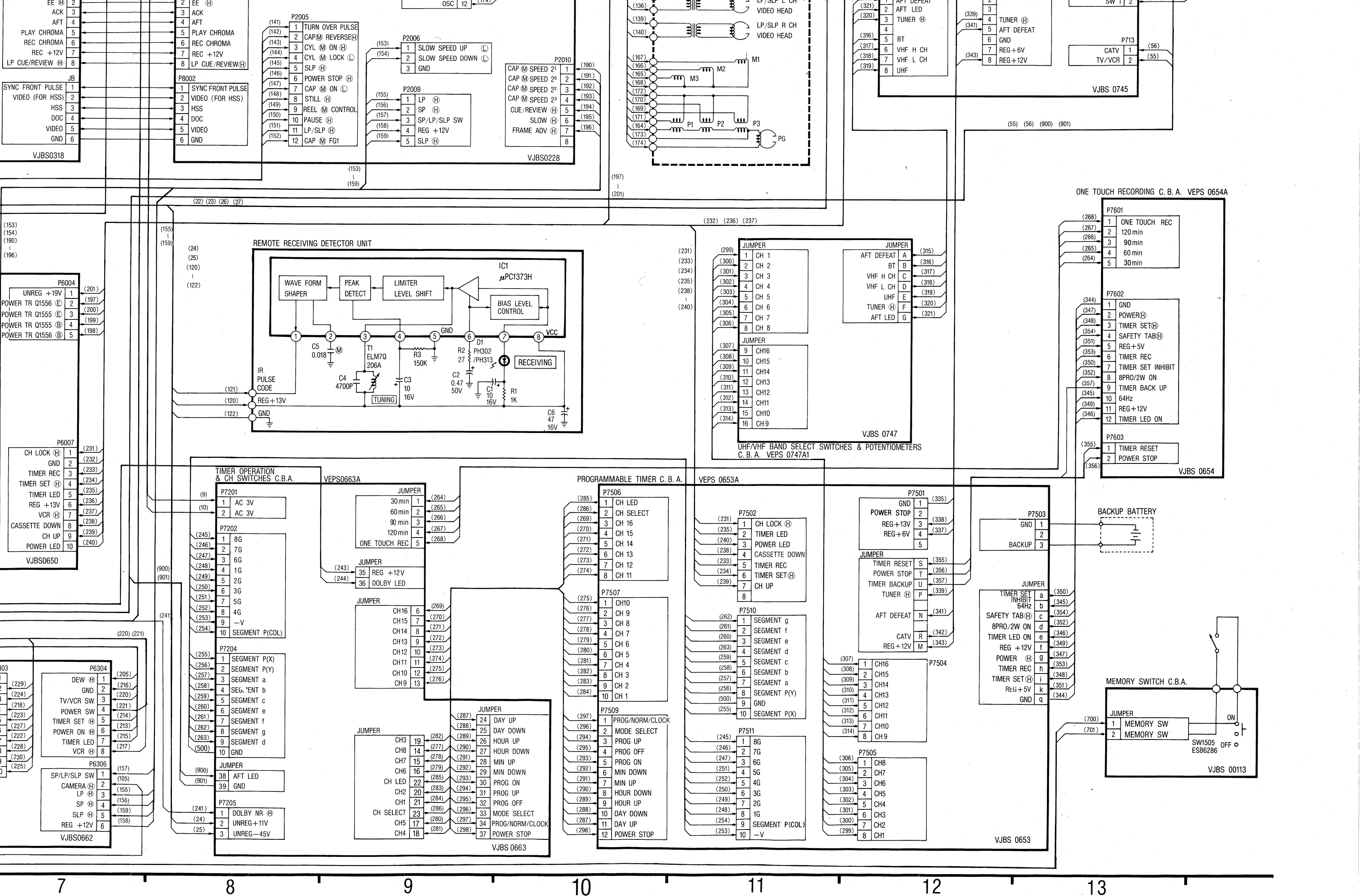
IMPORTANT SAFETY NOTICE:

Components identified by the sign Δ have special characteristics important for safety. When replacing any of these components, use only the specified parts.









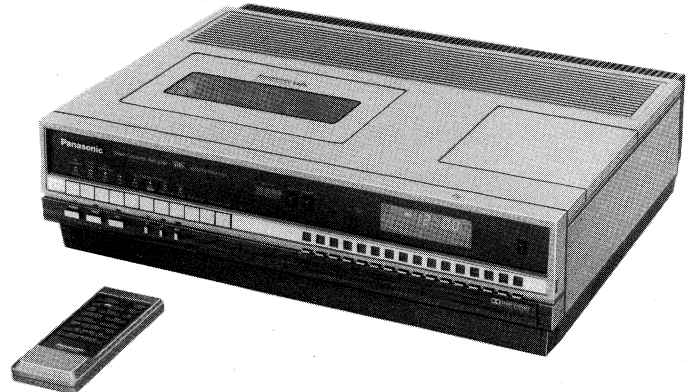
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Service Manual

Video Cassette Recorder

Vol. 5**Panasonic**
Omnivision **VHS****PV-1780**

Exploded Views Replacement Parts List



SPECIFICATIONS

Power Source: 120 V AC $\pm 10\%$, 60 Hz $\pm 0.5\%$
 Power Consumption: Approx. 47 watts
 Television System: EIA Standard (525 lines, 60 fields)
 NTSC color signal

Video Recording

System: 4 rotary heads helical scanning system
 Luminance: FM azimuth recording
 Chrominance: Converted subcarrier phase shift recording

Audio Track: 2 track
 Tape Format: Tape width 1/2" (12.7 mm), high density tape

Tape Speed: SP mode: 1-5/16 i.p.s (33.35 mm/s)
 LP mode: 21/32 i.p.s (16.67 mm/s)
 SLP mode: 7/16 i.p.s (11.12 mm/s)

Record/Playback Time: 360 min. with NV-120 used in SLP mode

FF/REW Time: Less than 6 min with NV-T120

Heads: Video: 4 rotary heads
 Audio: 2 stationary heads/
 Control: 1 stationary head
 Erase: 1 full track erase
 1 audio track erase for audio dubbing

Input Level: Video: Video IN Jack (RCA type)
 1.0 Vp-p, 75 Ω unbalanced
 Audio: MIC IN Jack (Right, left)
 -70 dB, 4 k Ω unbalanced
 Audio IN Jack (RCA type)
 -20 dB, 100 k Ω unbalanced

TV Tuners: VHF Input: Ch2-Ch3,
 cable channels "A"—"W"
 75 Ω unbalanced
 UHF Input: UHF Ch14-Ch83,
 300 Ω balanced

Output Level: Video: Video OUT Jack (RCA type)
 1.0 Vp-p, 75 Ω unbalanced
 Audio: Audio OUT Jack (RCA type)
 (Right, left)
 -9 dB, 600 Ω unbalanced

RF Modulated: Channel 3 or 4
 72 dB μ , (Open voltage)
 75 Ω unbalanced

Video Horizontal

Resolution: Color: more than 230 lines
 B/W: more than 270 lines

Audio Frequency

Response: SP mode: 100 Hz ~ 8 kHz
 LP mode: 100 Hz ~ 6 kHz
 SLP mode: 150 Hz ~ 5 kHz (10 dB down)

Signal-to-Noise Ratio: Video: better than 40 dB
 (Rohde & Schwarz noise meter)
 Audio: SP mode: better than 42 dB
 LP mode: better than 40 dB
 SLP mode: better than 40 dB
 (Dolby NR ON)

Operation

Temperature: 41°F—104°F (5°C—40°C)
 Operating Humidity: 10%—75%
 Weight: 25.3 lbs (11.5 kg)
 Dimensions: 18-7/8" (W) \times 14-1/4" (D) \times 5-3/8" (H)
 (480 mm \times 356 mm \times 136 mm)

Accessories Supplied:

- Blank tape
- Wireless remote control unit
- 75 Ω —300 Ω matching transformer
- 300 Ω —75 Ω matching transformer
- Coaxial cable (5 ft) with F type connectors
- Twin lead wire (5 ft)
- Dust cover
- Vertical-Lock tool

Available Tapes:

1/2" VHS video cassette tapes
 NV-T120 Approx. 810 ft. (247 m),
 2, 4 or 6 hrs.
 NV-T60 Approx. 417 ft. (127 m),
 1, 2 or 3 hrs.

Weight and dimensions shown are approximate. Specifications are subject to change without notice.

Panasonic®

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 Division of Matsushita Electric
 Corporation of America
 One Panasonic Way, Secaucus,
 New Jersey 07094

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 Honolulu, Hawaii 96808-0774

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 Ontario, L4W 2T3

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 Division of Matsushita Electric
 of Puerto Rico, Inc.
 Ave. 65 De Infanteria, KM 9.7
 Victoria Industrial Park
 Carolina, Puerto Rico 00630

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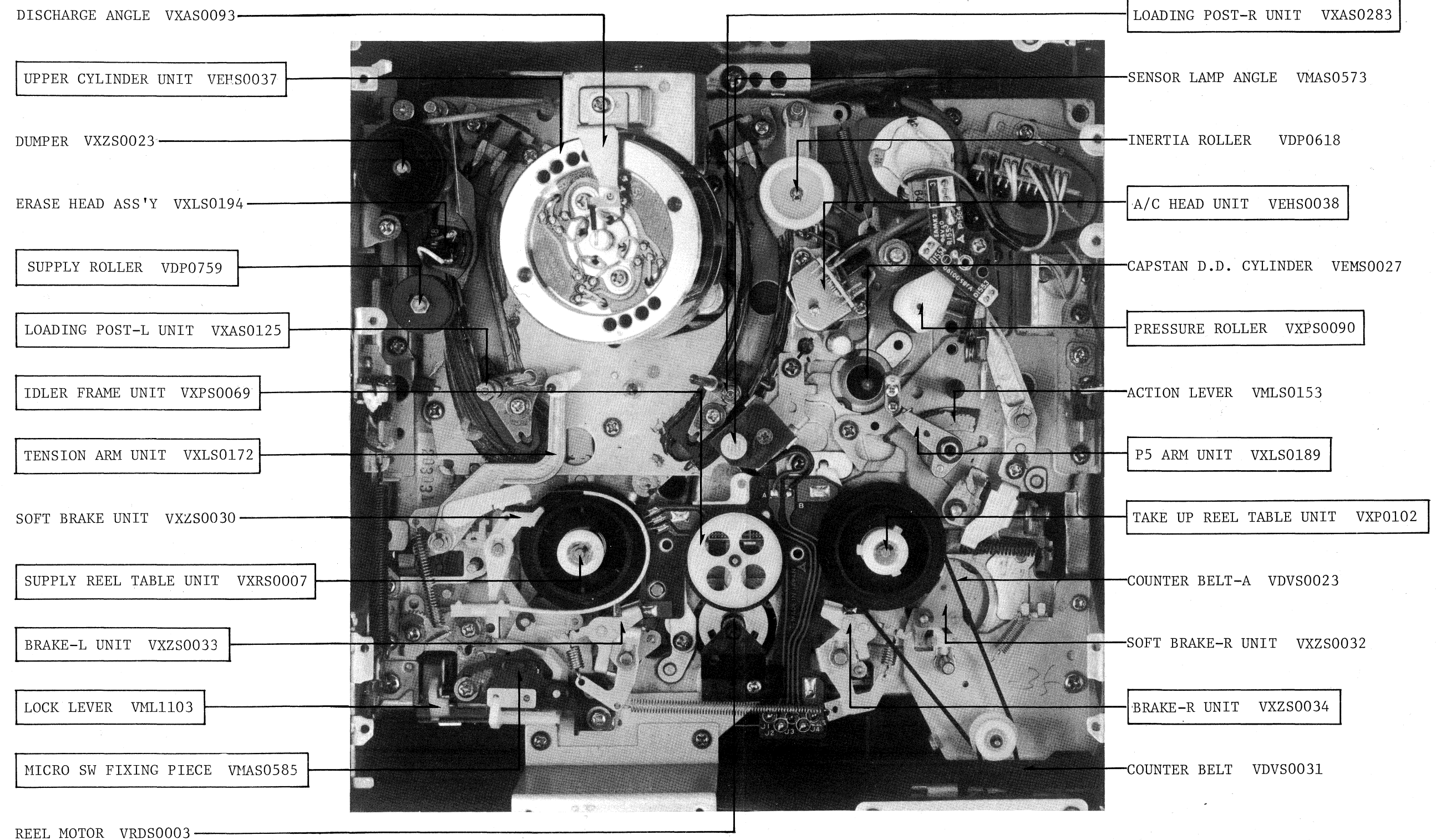
SPECIFICATIONS	Cover
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INNER PARTS LOCATION

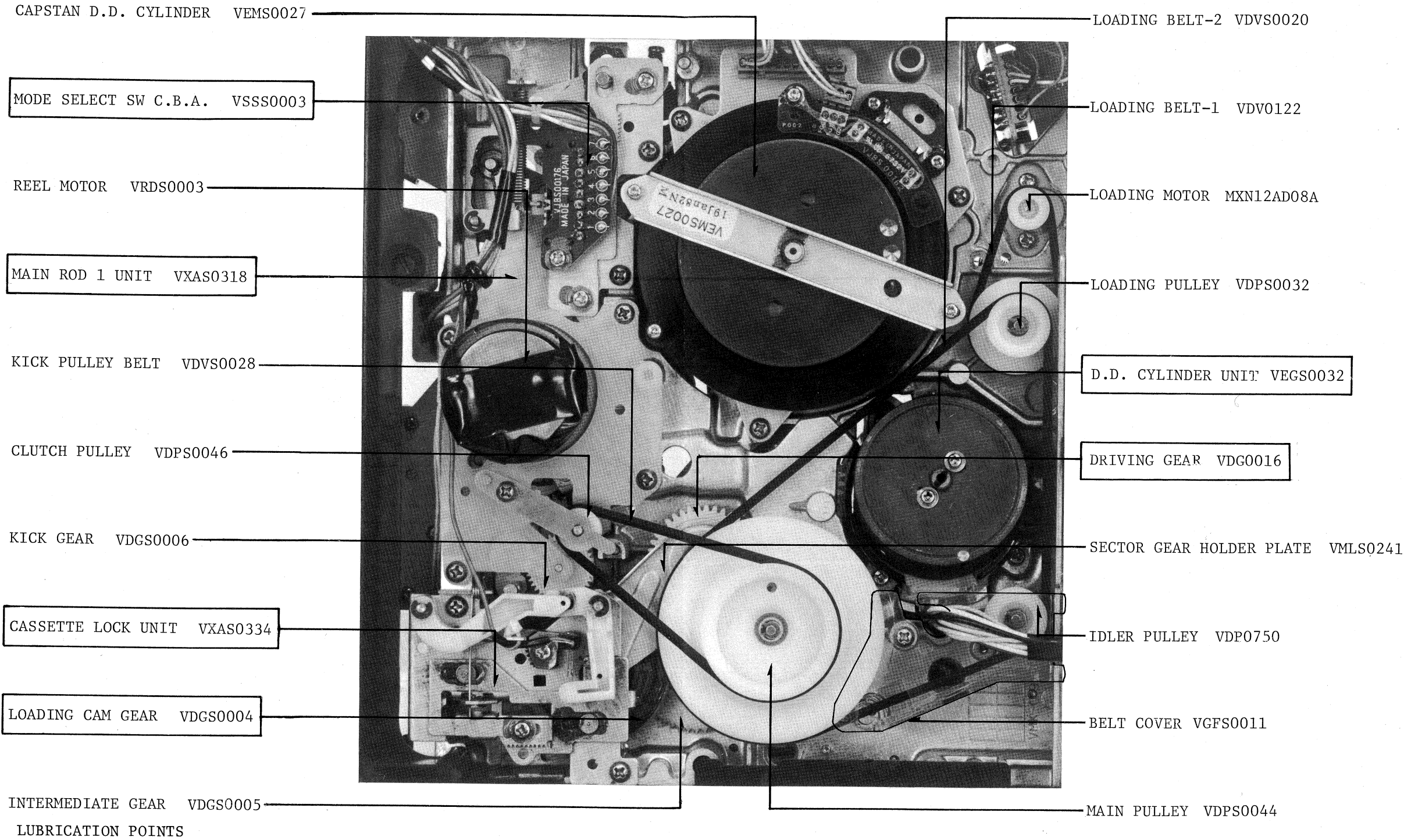
Top View

Note:

When the mechanical parts surrounded with rectangle were removed or replaced, be sure to perform necessary adjustment or confirmation procedures according to the mechanical adjustment procedures section.



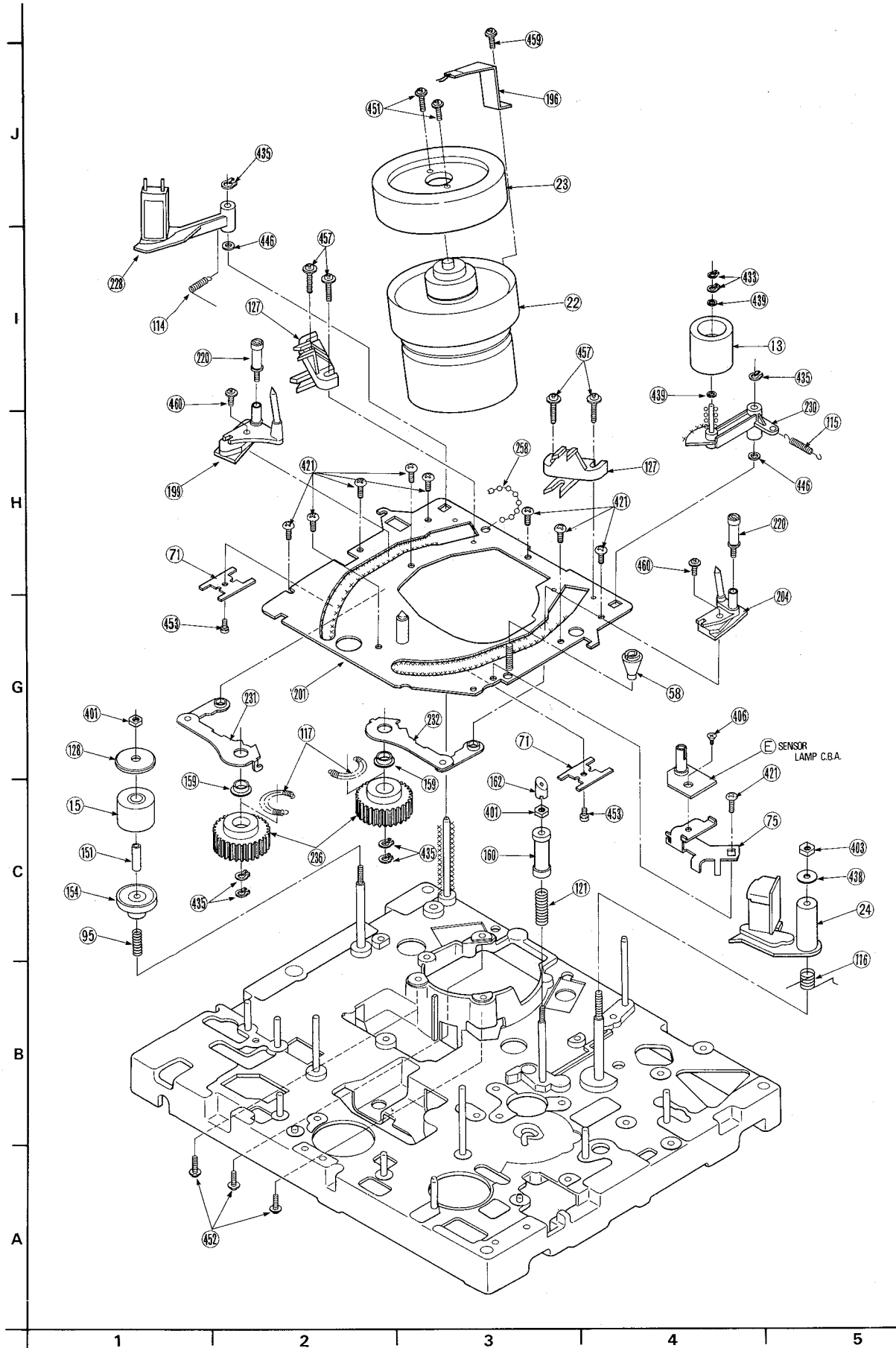
Bottom View



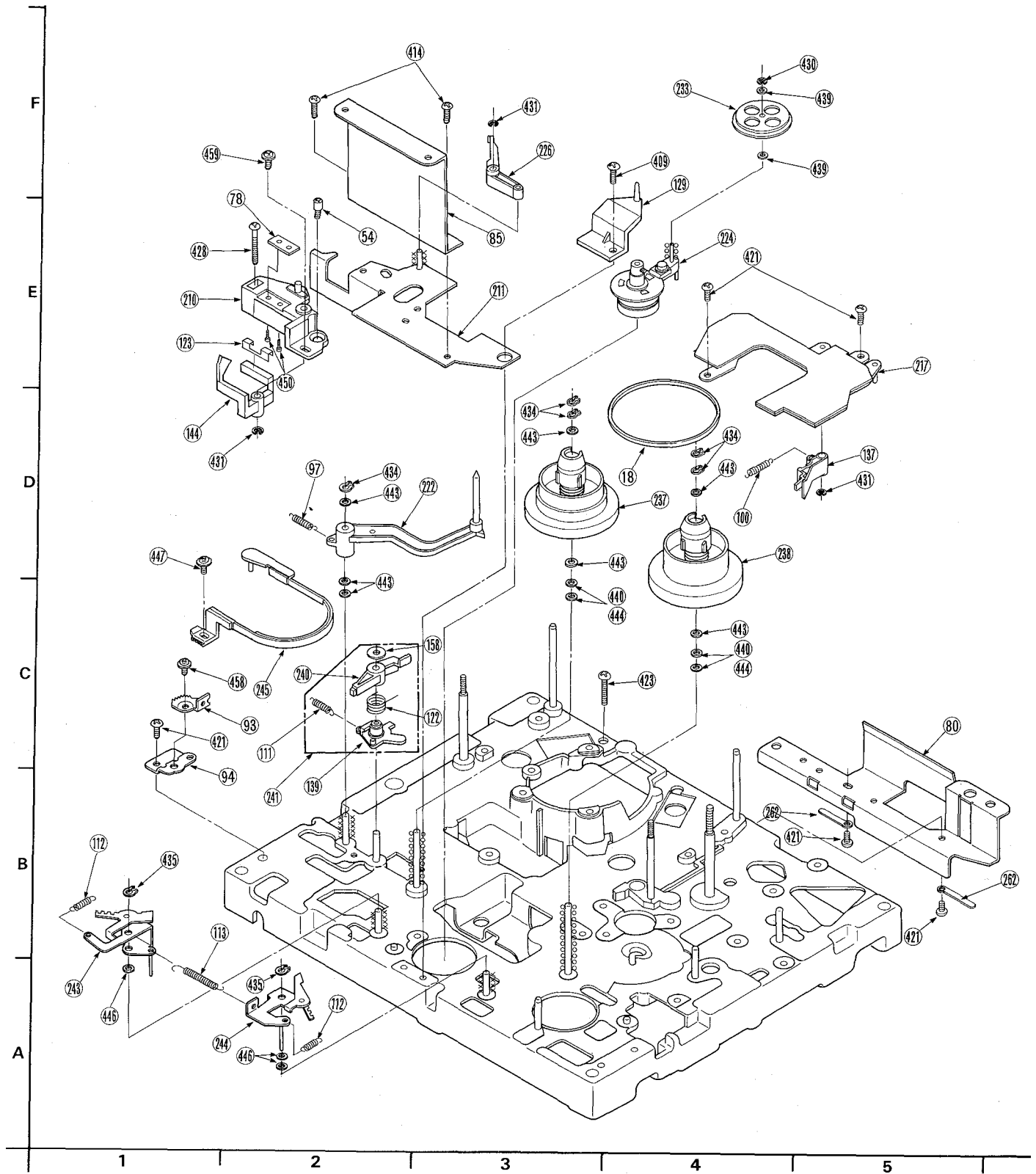
When the marked parts are replaced, apply the recommended lubricants or adhesive for better maintenance of the unit.

Marks	Kind of Lubricant	Availability	Part Number
×××	Morlytone Grease	Available From Factory	MOR265
○○○	Spindle Oil	Purchase From Local Supplier
△△△	Gummed Adhesive	Purchase From Local Supplier

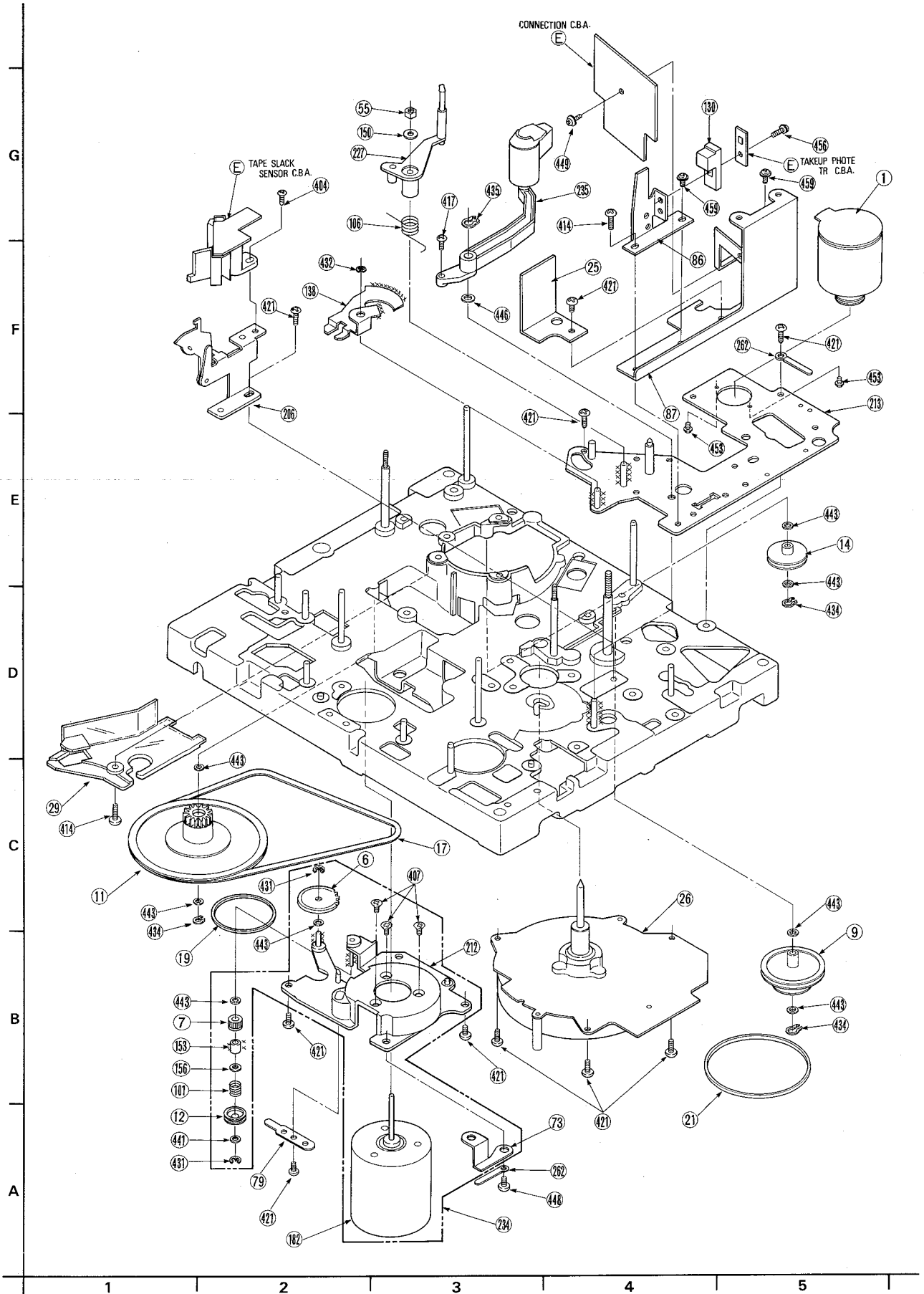
EXPLODED VIEWS **1** *Transport Section*



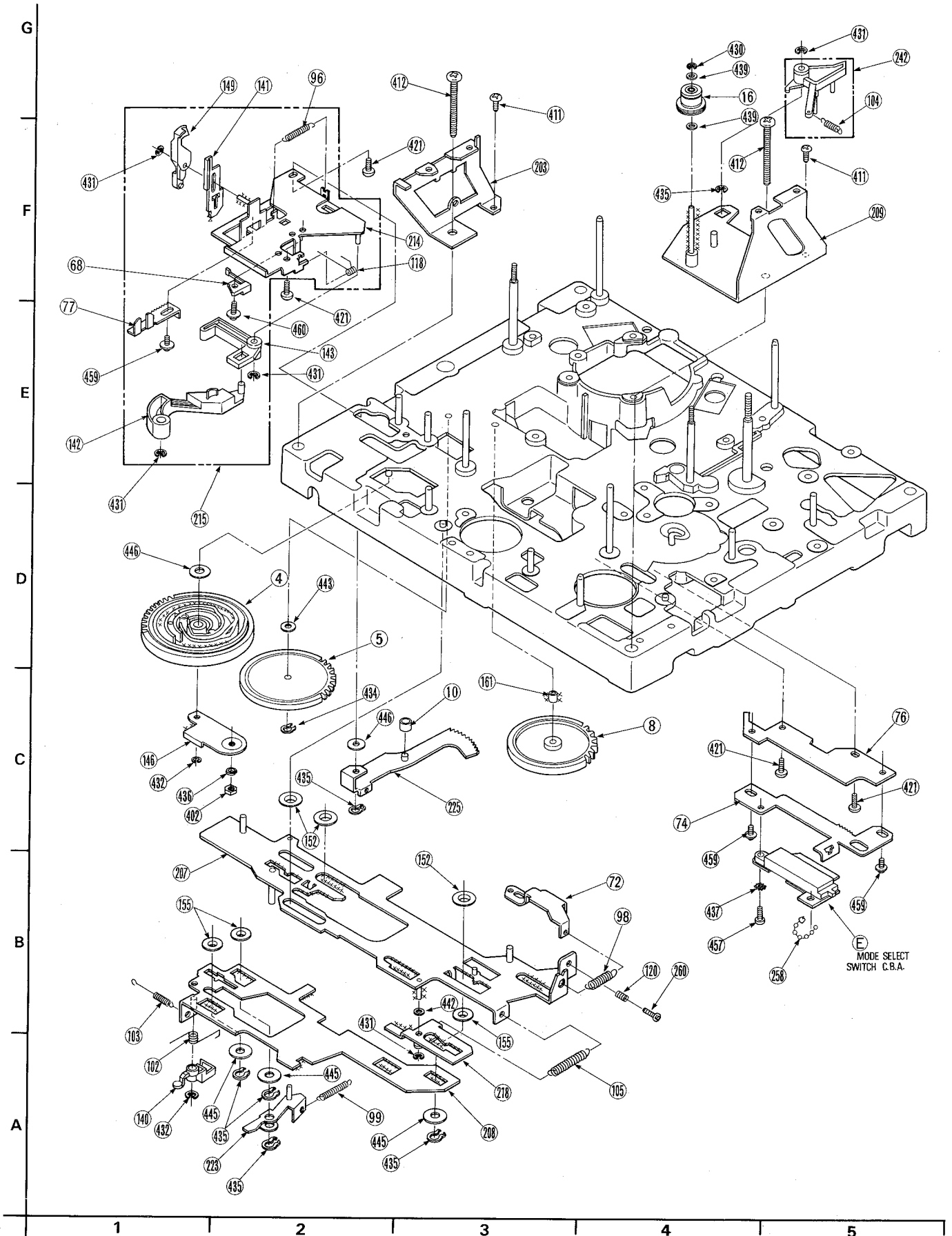
② Moving Mechanism Section-(1)



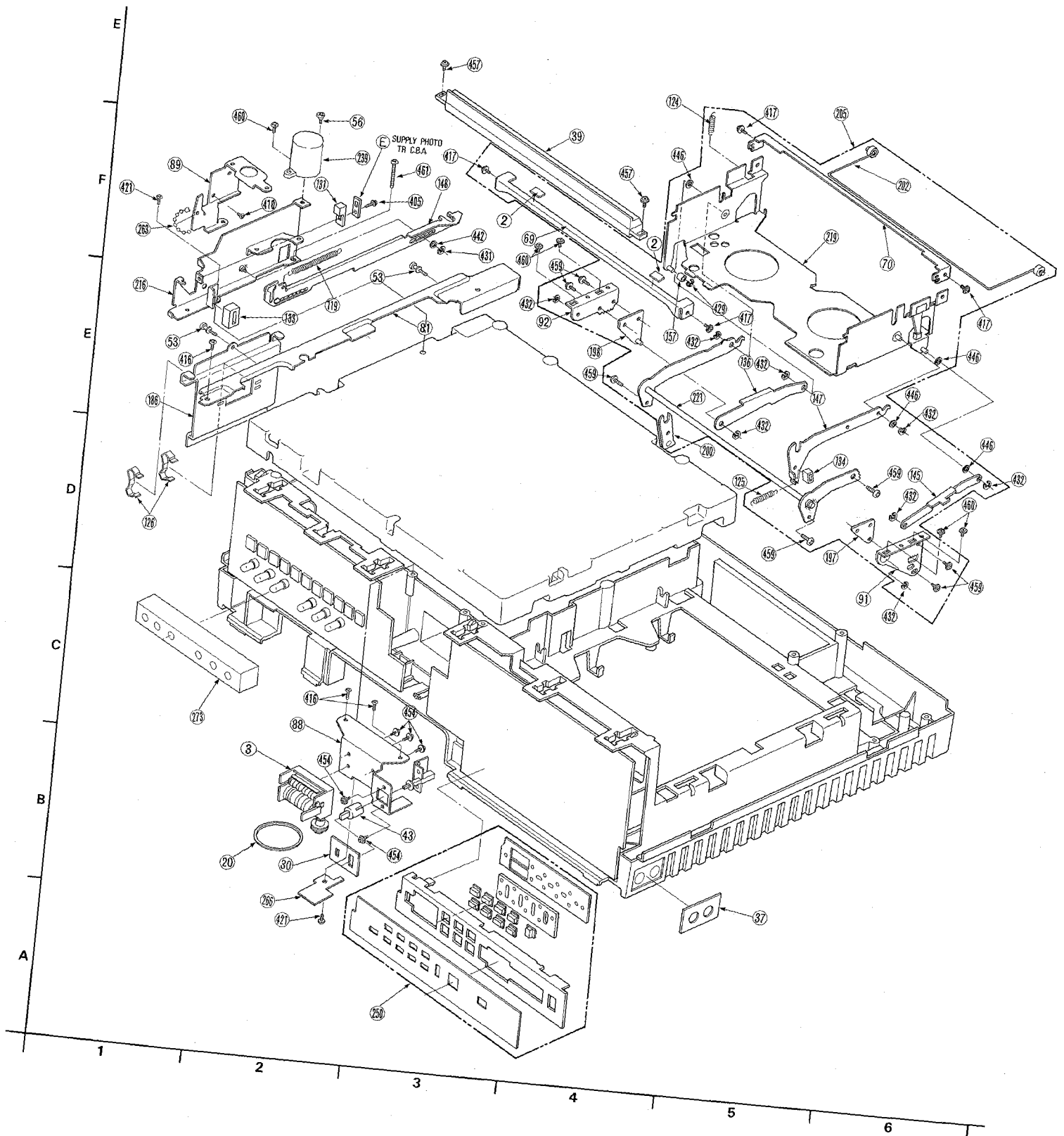
3 Chassis Parts Section



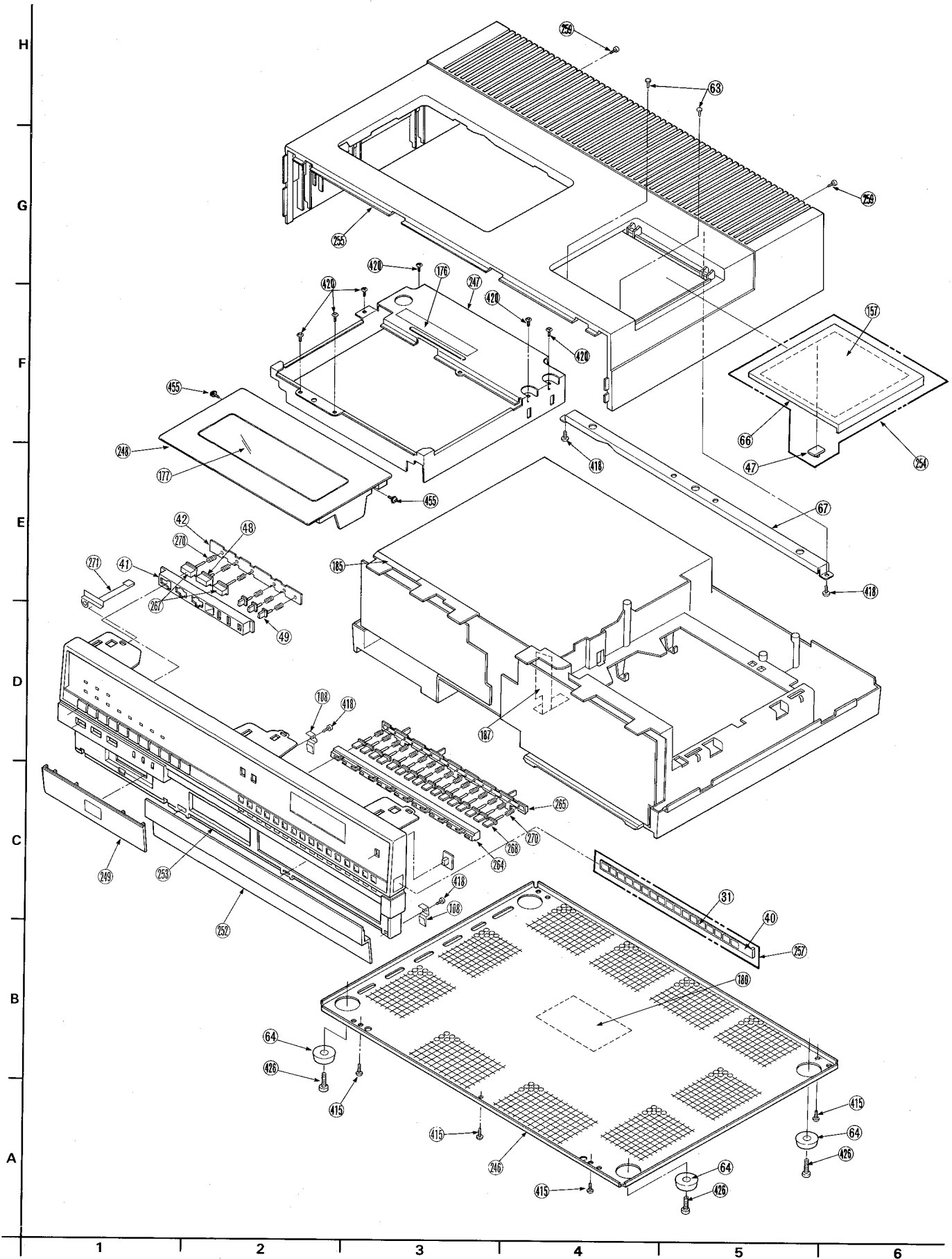
4 Moving Mechanism Section-(2)



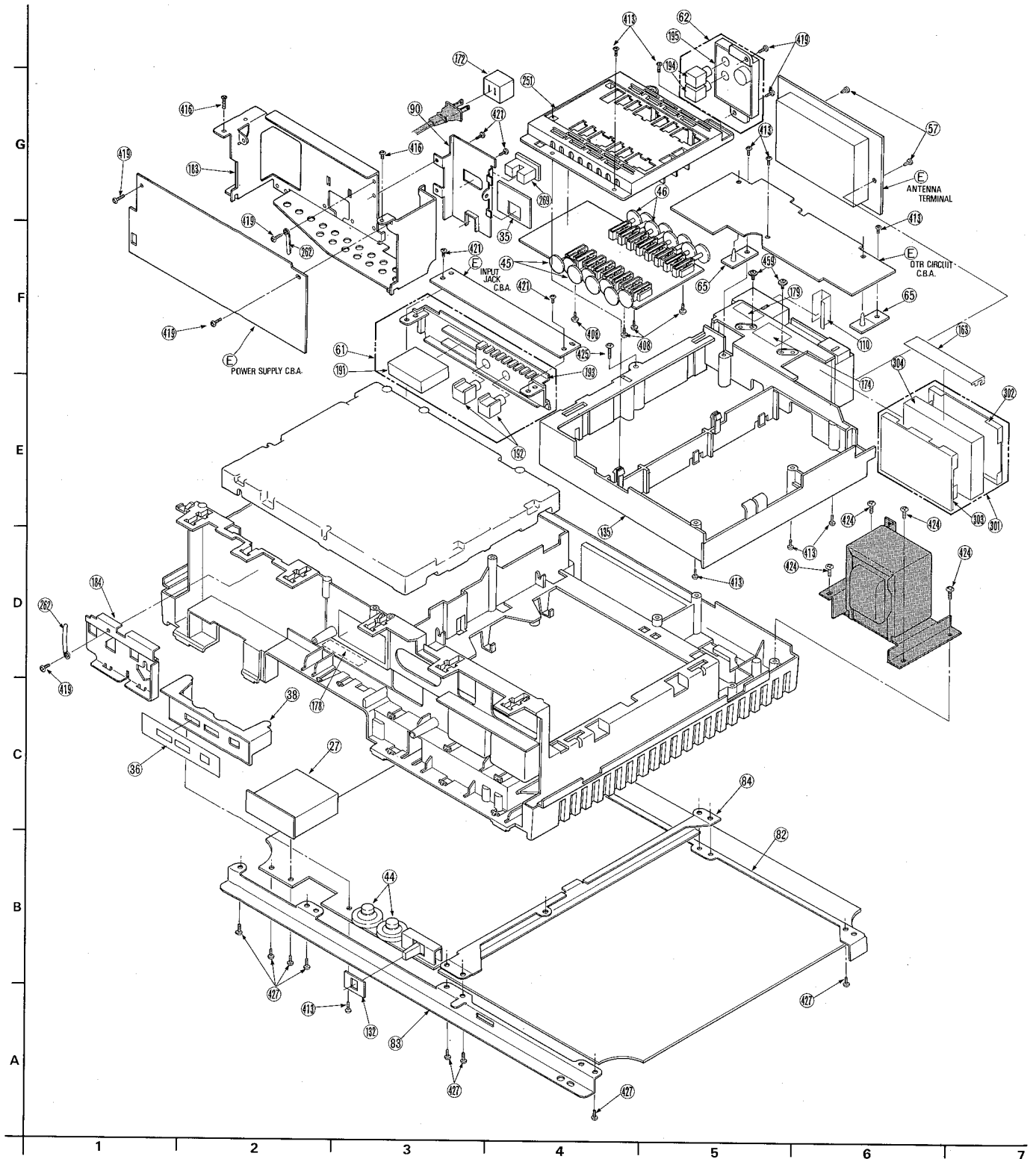
5 *Chassis Frame Section*



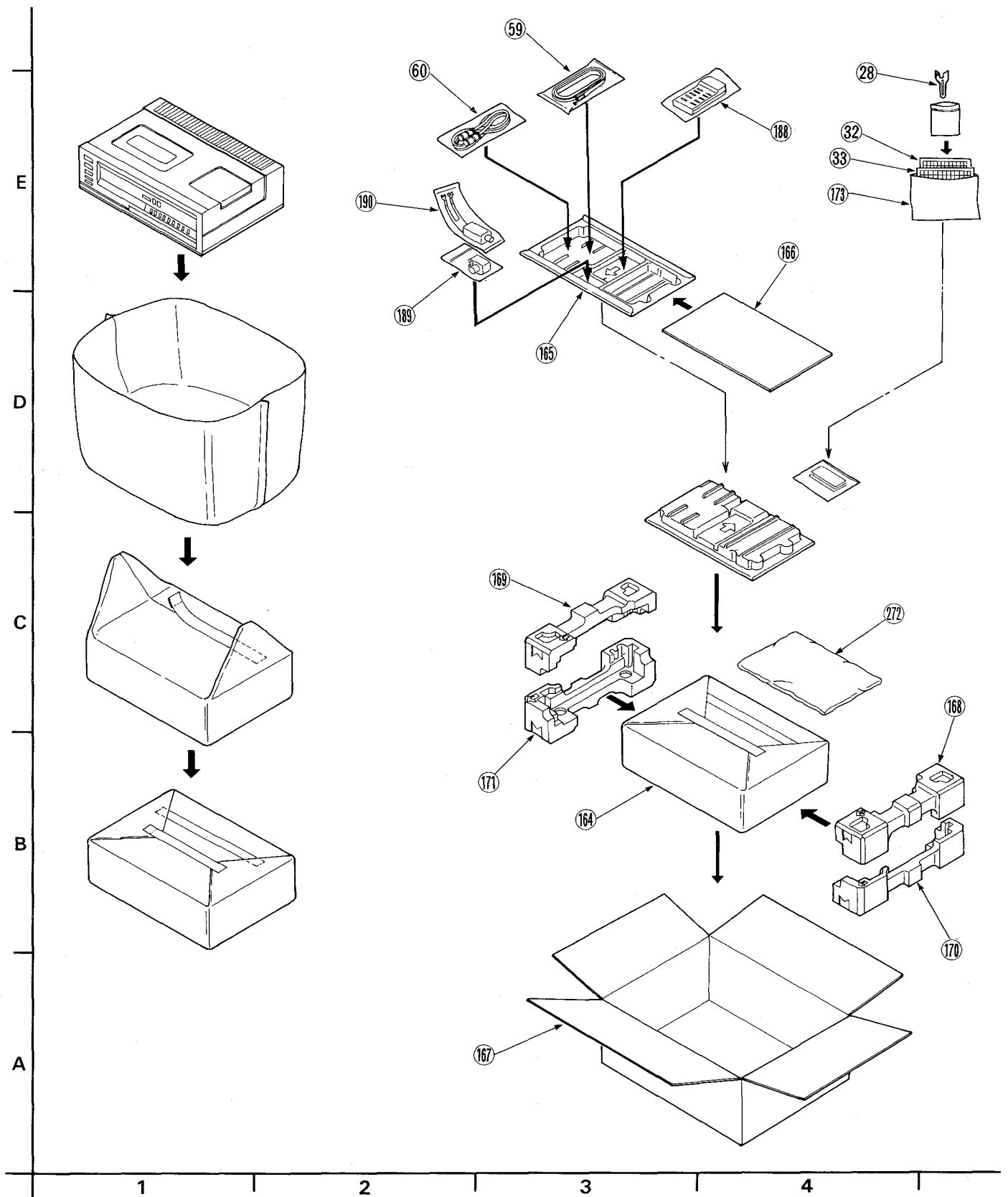
6 Casing Parts Section-(1)



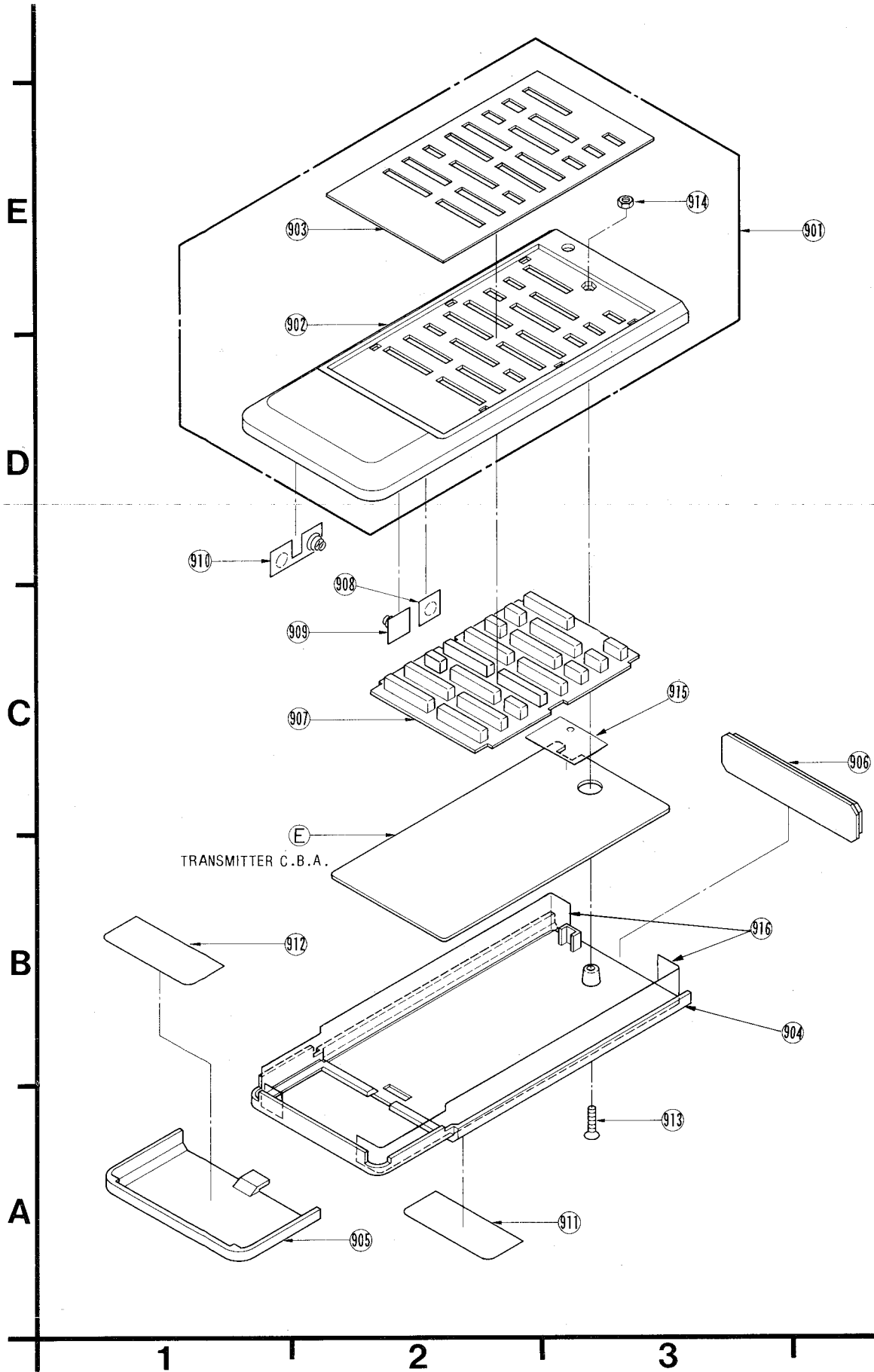
7 Casing Parts Section-(2)



8 Packing Parts Section



9 Remote Control Trausmitter section



MECHANICAL REPLACEMENT PARTS LIST

Model No. PV-1780

Note: *Be sure to make your orders of replacement parts according to this list.
Since all parts are available, availability column indicates no mark.



Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark
1	3	LOADING MOTOR	1		MXN12AD08A or VRDS0002	
2	5	PLASTIC PLATE	2		TMK98010	
3	5	COUNTER	1		VDCS0001	
4	4	LOADING CAM GEAR	1		VDGS0004	
5	4	INTERMEDIATE GEAR	1		VDGS0005	
6	3	KICK GEAR	1		VDGS0006	
7	3	CLUTCH GEAR	1		VDGS0007	
8	4	DRIVING GEAR	1		VDC0016	
9	3	LOADING PULLEY	1		VDP0032	
10	4	CAM FOLLOWER ROLLER	1		VDP0039	
11	3	MAIN PULLEY	1		VDP0044	
12	3	CLUTCH PULLEY	1		VDP0046	
13	1	INERTIA ROLLER	1		VDP0618	
14	3	IDLER PULLEY	1		VDP0750	
15	1	SUPPLY ROLLER (K)	1		VDP0759	
16	4	COUNTER PULLEY	1		VDP0781	
17	3	LOADING BELT-2	1		VDVS0020	
18	2	COUNTER BELT (A)	1		VDVS0023	
19	7	KICK PULLEY BELT	1		VDVS0028	
20	5	COUNTER BELT	1		VDVS0035	
21	3	LOADING BELT-1	1		VDV0122	
22	1	DD CYLINDER UNIT	1		VEGS0032	
23	1	UPPER CYLINDER UNIT	1		VEHS0037	
24	1	A/C HEAD UNIT	1		VEHS0038	
25	3	DEW SENSOR UNIT	1		VEKS0724	
26	3	CAPSTAN DD CYLINDER	1		VEMS0027	
27	7	IR WIRELESS RECEIVING DETECTOR UNIT	1		VEQS0194	
28	8	V-HOLD ADJ TOOL	1		VFKS0014	
29	3	BELT COVER	1		VGFS0011	
30	5	COUNTER SHEET	1		VGKS0265	
31	6	VHF CHANNEL FILM	1		VGKS0432	
32	8	UHF CHANNEL FILM	1		VGKS0433	
33	8	CATV CHANNEL FILM	1		VGKS0465	
34						
35	7	AC CORD DECORATION	1		VGNS0478	
36	7	TRACKING VR BRACKET DECORATION	1		VGNS0467	
37	5	V-LOCK INDICATING PLATE	1		VGNS0458	
38	7	TRACKING VR BRACKET	1		VGFS0403	
39	5	CASSETTE GUIDE	1		VGQS0048	
40	6	FILM HOLDER	1		VGQS0162	
41	6	POWER BUTTON HOLDER (A)	1		VGMS0018	
42	6	POWER BUTTON HOLDER (B)	1		VGMS0019	
43	5	MEMORY SWITCH KNOB	1		VGTS0024	
44	7	TRACKING KNOB	2		VGTS0068	
45	7	TUNING KNOB (A)	8		VGTS0069	
46	7	TUNING KNOB (B)	8		VGTS0070	
47	6	AFT SWITCH KNOB	1		VGTS0071	
48	6	TIMER REC BUTTON	1		VGUS0200	
49	6	SPEED SELECT BUTTON	3		VGUS0199	

Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark
53	5	SCREW	2		VHDS0006	
54	2	SCREW	1		VHDS0009	
55	3	M3 NUT	1		VHD0045	
56	5	SCREW	1		VHD0052	
57	7	PLASTIC STOPPER	2		VHNS0016	
58	1	ADJUST NUT-2	1		VHNS0017	
59	8	TWIN LEAD CONNECTOR	1		VJA0102	
60	8	FF CABLE	1		VJA0147	
61	7	REAR JACK UNIT	1		VJHS0014	
62	7	OUTPUT JACK UNIT	1		VJHS0017	
63	6	TUNING DOOR CUSHION	2		VKAS0005	
64	6	CUSHION	4		VKAS0009	
65	7	HINGE	2		VKCS0005	
66	6	TUNING KNOB PANEL	1		VKUS0045	
67	6	TOP COVER ANGLE	1		VMAS0341	
68	4	SAFETY SW EARTH ANGLE	1		VMAS0495	
69	5	CASSETTE COMPARTMENT SUPPORT ANGLE (FRONT)	1		VMAS0502	
70	5	CASSETTE COMPARTMENT SUPPORT ANGLE (REAR)	1		VMAS0503	
71	1	SHAFT HOLDER PLATE	2		VMAS0545	
72	4	SPRING HOOK ANGLE	1		VMAS0566	
73	3	GROUNDING ANGLE	1		VMAS0570	
74	4	SWITCH HOLDER (B)	1		VMAS0572	
75	1	SENSOR LAMP ANGLE	1		VMAS0573	
76	4	SWITCH HOLDER (A)	1		VMAS0574	
77	4	LOCK LEVER ADJUSTMENT PLATE	1		VMAS0582	
78	2	MICRO SW FIXING PIECE	1		VMAS0585	
79	3	BELT GUARD-2	1		VMAS0593	
80	2	CHASSIS BRACKET	1		VMAS0616	
81	5	SIDE PB ANGLE	1		VMAS0621	
82	7	LUMINANCE CHROMINANCE C.B.A. ANGLE (REAR)	1		VMAS0622	
83	7	LUMINANCE CHROMINANCE C.B.A. ANGLE (FRONT)	1		VMAS0623	
84	7	LUMINANCE CHROMINANCE C.B.A. ANGLE (CENTER)	1		VMAS0638	
85	2	SHIELD CASE SUPPORT ANGLE	1		VMAS0656	
86	3	TRANSISTOR BRACKET (R)	1		VMAS0658	
87	3	CONNECTION P.C.B. ANGLE	1		VMAS0662	
88	5	COUNTER ANGLE	1		VMAS0721	
89	5	TRANSISTOR HOLDER GUARD	1		VMAS0665	
90	7	POWER CORD ANGLE	1		VMAS0672	
91	5	HOLD ANGLE (R)	1		VMAS0677	
92	5	HOLD ANGLE (L)	1		VMA4003	
93	2	ADJUST HOOK	1		VMA4089	
94	2	ADJUSTMENT PLATE	1		VMA4090	
95	1	SUPPLY INERTIA SPRING	1		VMBS0071	
96	4	EJECT SPRING	1		VMBS0077	
97	2	TENSION SPRING	1		VMBS0107	
98	4	PRESSURE SPRING	1		VMBS0112	
99	4	MAIN BRAKE RELEASE LEVER SPRING	1		VMBS0113	
100	2	IDLER STOPPER SPRING	1		VMBS0114	
101	3	CLUTCH SPRING	1		VMBS0115	
102	4	KICK LEVER SPRING	1		VMBS0116	
103	4	SUB ROD SPRING	1		VMBS0117	
104	4	SOFT BRAKE SPRING (T)	1		VMBS0121	
105	4	BRAKE KICK LEVER SPRING	1		VMBS0122	

Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark	Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark
106	3	P5 ARM SPRING	1		VMBS0123		160	1	POST SLEEVE	1		VMX0267	
107							161	4	GEAR PIPE	2		VMX0268	
108	6	TIMER DOOR SPRING	2		VMBS0179		162	1	POST CAP (P4)	1		VMX0271	
109	6	XPR BUTTON GROUNDING SPRING	1		VMBS0196		163	7	TUNER PB SHIELD SHEET	1		VMZS0072	
110	7	ANT TERMINAL GROUNDING SPRING	1		VMBS0219		164	8	POLYETHYLENE BAG	1		VPFS0019	
111	2	SOFT BRAKE SPRING	1		VMBS0219		165	8	ACCESSORY CASE	1		VPGS0379	
112	2	BRAKE LEVER SPRING	2		VMBS0219		166	8	ACCESSORY CASE PAD	1		VPGS0380	
113	2	BRAKE ARM SPRING	1		VMBS0219		167	8	PACKING CASE	1		VPGS0547	
114	1	ERASE HEAD LEVER	1		VMBS0219		168	8	RIGHT CUSHION (TOP)	1		VPNS0085	
115	1	INERTIA ROLLER ARM SPRING	1		VMBS0219		169	8	LEFT CUSHION (TOP)	1		VPNS0086	
116	1	A/C HEAD SPRING	1		VMBS0219		170	8	RIGHT CUSHION (BOTTOM)	1		VPNS0087	
117	1	LOADING SPRING	2		VMBS0219		171	8	LEFT CUSHION (BOTTOM)	1		VPNS0088	
118	4	STOPPER SPRING	1		VMBS0219		172	7	PLUG COVER	1		VPNS0088	
119	5	HOLDER SPRING (L)	1		VMBS0219		173	8	FAN BAG	1		VPNS0088	
120	4	ADJUST SPRING	1		VMBS0219		174	7	CAUTION LABEL	1		VPNS0088	
121	1	POST SPRING (P4)	1		VMBS0219		175	6	TUNING EXPLANATION LABEL	1		VPNS0088	
122	2	SOFT BRAKE COIL SPRING	1		VMBS0219		176	6	FUSE CAUTION LABEL	1		VPNS0088	
123	2	ACTUATOR SPRING	1		VMBS0219		177	6	STICKER	1		VPNS0088	
124	5	DISTINCTION LEVER SPRING	1		VMBS0219		178	7	BACK-UP CAPACITOR SERVICE LABEL	1		VPNS0088	
125	5	HOLDER SPRING (R)	1		VMBS0219		179	7	BATTERY SERVICE CAUTION LABEL-1	1		VPNS0088	
126	5	TRANSISTOR SPRING	3		VMBS0219		180	6	BOTTOM PANEL CAUTION LABEL	1		VPNS0088	
127	1	LOCK BASE UNIT	2		VMBS0219		181					VPNS0088	
128	1	INERTIA ROLLER UPPER LIMITER	1		VMBS0219		182	3	REEL MOTOR	1		VPNS0088	
129	2	TAPE LOCK RELEASE BRACKET	1		VMBS0219		183	7	HEAT SINK PLATE	1		VPNS0088	
130	3	TRANSISTOR HOLDER (R)	1		VMBS0219		184	7	TRANSISTOR HEAD SINK PLATE	1		VPNS0088	
131	5	TRANSISTOR HOLDER (L)	1		VMBS0219		185	6	GROUNDING FOIL	1		VPNS0088	
132	7	SWITCH COVER	1		VMBS0219		186	5	AUDIO SHIELD PLATE	1		VPNS0088	
133	5	CASSETTE DOWN SW LEVER STOPPER	1		VMBS0219		187	6	GROUNDING FOIL	1		VPNS0088	
134	5	CUSHION	1		VMBS0219		188	8	IR WIRELESS TRANSMITTER UNIT	1		VPNS0088	
135	-7	DEMODULATOR FRAME	1		VMBS0219		189	8	VHF MATCHING BOX	1		VPNS0088	
136	5	SUB ARM (L)	1		VMBS0219		190	8	VHF ANTENNA ADAPTOR	1		VPNS0088	
137	2	IDLER STOPPER	1		VMBS0219		191	7	MIC JACK	1		VPNS0088	
138	3	ACTION LEVER	1		VMBS0219		192	7	AUDIO IN JACK	1		VPNS0088	
139	2	SOFT BRAKE LEVER (A)	1		VMBS0219		193	7	FRONT JACK PLATE UNIT	1		VPNS0088	
140	4	KICK LEVER	1		VMBS0219		194	7	AUDIO OUT JACK	1		VPNS0088	
141	4	LOCK SLIDE LEVER	1		VMBS0219		195	7	REAR JACK PLATE UNIT	1		VPNS0088	
142	4	EJECT LEVER (A)	1		VMBS0219		196	1	DISCHARGE ANGLE	1		VPNS0088	
143	4	EJECT LEVER (B)	1		VMBS0219		197	5	ADJUSTMENT PLATE R UNIT	1		VPNS0088	
144	2	SENSING LEVER	1		VMBS0219		198	5	ADJUSTMENT PLATE L UNIT	1		VPNS0088	
145	5	SUB RM (R)	1		VMBS0219		199	1	LOADING POST L UNIT	1		VPNS0088	
146	4	SECTOR GEAR HOLDER PLATE	1		VMBS0219		200	5	STOPPER ANGLE UNIT	1		VPNS0088	
147	5	MAIN ARM (R)	1		VMBS0219		201	1	LOADING BASE 1 UNIT	1		VPNS0088	
148	5	CONNECTING ROD	1		VMBS0219		202	5	CASSETTE HOLDING ROLLER UNIT	1		VPNS0088	
149	4	LOCK LEVER	1		VMBS0219		203	4	CHASSIS ANGLE L UNIT	1		VPNS0088	
150	3	WASHER	1		VMBS0219		204	1	LOADING POST R UNIT	1		VPNS0088	
151	1	COLLAR	1		VMBS0219		205	5	CASSETTE UP UNIT	1		VPNS0088	
152	4	SLIDER WASHER	3		VMBS0219		206	3	CASSETTE OPENER UNIT	1		VPNS0088	
153	3	CLUTCH COLLAR	1		VMBS0219		207	4	MAIN ROD 1 UNIT	1		VPNS0088	
154	1	INERTIA ROLLER LOWER LIMITER	1		VMBS0219		208	4	SUB ROD 1 UNIT	1		VPNS0088	
155	4	WASHER	3		VMBS0219		209	4	CHASSIS ANGLE R 1 UNIT	1		VPNS0088	
156	3	POLY SLIDER WASHER	1		VMBS0219		210	2	CASSETTE SUPPORTER	1		VPNS0088	
157	5	LOCK COLLAR	1		VMBS0219		211	2	SOFT BRAKE RELEASE LEVER BASE UNIT	1		VPNS0088	
158	2	SOFT BRAKE STOPPER	1		VMBS0219		212	3	REEL MOTOR BRACKET UNIT	1		VPNS0088	
159	1	ARM SLEEVE	2		VMBS0219		213	3	P5 POST BASE 1 UNIT	1		VPNS0088	

Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark	Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark
214	4	LOCK BASE UNIT	1		VXAS0333		266	5	BLIND HOLDER	1		VGNS0506	
215	4	CASSETTE LOCK UNIT	1		VXAS0334		267	6	POWER BUTTON	2		VGUS0198	
216	5	SENSOR ANGLE 1 UNIT	1		VXAS0335		268	6	CHANNEL SELECT BUTTON	16		VGUS0201	
217	2	REEL SENSOR PB ANGLE 1 UNIT	1		VXAS0339		269	7	AC OUTLET	1		VJS1085	
218	4	BRAKE KICK LEVER UNIT	1		VXAS0343		270	6	POWER BUTTON RETURN SPRING	22		VMB0199	
219	5	CASSETTE HOLDER UNIT	1		VXAS0349		271	6	GROUNDING PLATE	1		VSCS0223	
220	1	ROLLER POST UNIT	2		VXA0743		272	8	DUST COVER	1		VYCS0060	
221	5	MAIN ARM L UNIT	1		VXLS0093		273	5	CUSHION	1		VMTS0027	
222	2	TENSION ARM UNIT	1		VXLS0172								
223	4	MAIN BRAKE RELEASE LEVER UNIT	1		VXLS0178								
224	2	IDLER ARM UNIT	1		VXLS0182								
225	4	SECTOR GEAR UNIT	1		VXLS0183								
226	2	SOFT BRAKE RELEASE LEVER UNIT	1		VXLS0184								
227	3	P5 ARM UNIT	1		VXLS0189								
228	1	ERASE HEAD ASS'Y	1		VXLS0193 or VXLS0194								
229													
230	1	INERTIA ROLLER ARM 1 UNIT	1		VXL0746								
231	1	LOADING ARM L UNIT	1		VXL0753								
232	1	LOADING ARM R UNIT	1		VXL0754								
233	2	IDLER FRAME UNIT	1		VXPS0069								
234	3	REEL MOTOR UNIT	1		VXPS0089								
235	3	PRESSURE ROLLER	1		VXPS0090								
236	1	LOADING GEAR UNIT	2		VXP0325								
237	2	SUPPLY REEL TABLE UNIT	1		VXRS0007								
238	2	TAKE-UP REEL TABLE UNIT	1		VXR0102								
239	5	DUMPER	1		VXZS0023								
240	2	LOADING BRAKE ARM UNIT	1		VXZS0029		401	1	M3 NUT	2		XNG3B	
241	2	SOFT BRAKE UNIT	1		VXZS0030		402	4	M3 NUT	1		XNG3C	
242	4	SOFT BRAKE R UNIT	1		VXZS0032		403	1	M4 NUT	1		XNG4	
243	2	BRAKE L UNIT	1		VXZS0033		404	3	BIND SCREW, 3x8	1		XSB3+8KS	
244	2	BRAKE R UNIT	1		VXZS0034		405	5	SCREW, 3x8	1		XSN3+8S	
245	2	TENSION BAND UNIT	1		VXZ0076		406	1	SCREW, 2.6x4	1		XSS26+4S	
246	6	BOTTOM PANEL UNIT	1		VYFS0033		407	3	SCREW, 3x6	3		XSS3+6S	
247	6	SHIELD CASE UNIT	1		VYFS0035		408	7	TAPPING SCREW, 2x6	4		XTN2+6B	
248	6	CASSETTE COVER	1		VYPS0606		409	2	TAPPING SCREW, 3x10	1		XTN3+10FS	
249	6	REMOTE CONTROL DOOR	1		VYPS1105		410	5	TAPPING SCREW, 3x4	1		XTN3+4FS	
250	5	TIMER BRACKET UNIT	1		VYPS1172		411	4	TAPPING SCREW, 3x8	2		XTN3+8FS	
251	7	TUNING VR CASE UNIT	1		VYPS1169		412	4	TAPPING SCREW, 4x35	2		XTN4+35A	
252	6	TIMER DOOR UNIT	1		VYPS1187		413	7	TAPPING SCREW, 3x10	15		XTV3+10B	
253	6	FRONT PANEL 2 UNIT	1		VYPS1312		414	2,3	TAPPING SCREW, 3x10	3		XTV3+10FS	
254	6	TUNING DOOR UNIT	1		VYPS1190		415	6	TAPPING SCREW, 3x10	5		XTV3+10JKS or XTV3+10LKS	
255	6	TOP COVER UNIT	1		VYPS1191								
256							416	5	TAPPING SCREW, 3x12	8		XTV3+12BR	
257	6	FILM HOLDER UNIT	1		VYQS0019		417	5,3	TAPPING SCREW, 3x6	8		XTV3+6FS	
258	1,4	FASTENER	3		TYB-23M or T18S		418	6	TAPPING SCREW, 3x8	5		XTV3+8B	
259	6	SCREW	2		VHDS0011 or XSB4+12KS		419	7	TAPPING SCREW, 3x8	9		XTV3+8C	
260	4	SCREW	1		VHDS0022		420	6	TAPPING SCREW, 3x8	6		XTV3+8FRS	
261	5	PLASTIC RIVET	1		VHN0011		421	1,2,3,4	TAPPING SCREW, 3x8	36		XTV3+8FS	
262	2,3,7	CLAMPER	6		VJR3		422	3	TAPPING SCREW, 3x8	1		XTV3+8GS	
263	5	FASTENER	6		WZBV1		423	2	TAPPING SCREW, 4x12	1		XTV4+12A	
264	6	CHANNEL SELECT BUTTON HOLDER (A)	1		VGMS0020		424	7	TAPPING SCREW, 4x12	4		XTV4+12B	
265	6	CHANNEL SELECT BUTTON HOLDER (B)	1		VGMS0021		425	7	TAPPING SCREW, 4x12	1		XTV4+12BR	
							426	6	TAPPING SCREW, 4x15	4		XTV4+15B2	
							427	7	TAPPING SCREW, 3x10	11		XTW3+10L	
							428	2	TAPPING SCREW, 3x20	1		XTW3+20L	
							429	5	RETAINING RING E-TYPE, 1.5	1		XUC15FP	

[illegible]

Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark
		SERVICING FIXTURES & TOOLS				
		VHS ALIGNMENT TAPE			VFMS0001H6	
		DIAL TORQUE GAUGE			VFK0133	
		PLASTIC CLAMPER			VFK0180	
		ADAPTOR FOR VFK0133			VFK0134	
		FINE ADJ. SCREWDRIVER			VFK0136	
		(for 3mm ϕ , Long Shaft)				
		POST ADJ. SCREWDRIVER			VFK0137	
		POST ADJ. PLATE			VFKS0010	
		REEL TABLE HEIGHT FIXTURE			VFKS0009	
		TENSION POST ADJ. FIXTURE			VFKS0002	
		H-POSITION ADJ. FIXTURE			VFKS0003	
		CASSETTE HOLDER FIXTURE			VFKS0004	
		V-STOPPER ADJ. FIXTURE			VFKS0007	
		RETAINING RING REMOVER (for 3mm ϕ)			VFK0144	
		RETAINING RING REMOVER (for 4mm ϕ)			VFK0145	
		HEX WRENCH (for 0.9mm ϕ)			VFK0146	
		HEX WRENCH (for 1.5mm ϕ)			VFK76	
		HEX WRENCH (for 1.25mm ϕ)			VFK75	
		HEAD CLEANING STICK			VFK27	
		MORLYTONE GREASE			MOR265	
		FAN-TYPE TENSION GAUGE			VFK66	
		FINE ADJ. SCREWDRIVER			VFKS0021	
		(for 3mm ϕ , Short Shaft)				

Model No. PV-1780

Note:

1. Be sure to make your orders of replacement parts according to this list.

2. **IMPORTANT SAFETY NOTICE**

Components identified by shade have special characteristics important for safety. When replacing any of these components, use only the original ones.

3. Unless otherwise specified:

5. Unless otherwise specified,
All resistors are in OHMS (Ω), $1/8W$, $\pm 5\%$ carbon, $K=1,000\Omega$, $M=1,000K\Omega$.

All capacitors are in MICROFARADS (μ F) $\pm 10\%$ P=ppm/F

All coils are in MICROHENRIES (μH). $m=10^3 \mu$

4. C.B.A.: Circuit Board Assembly.

4. C.B.A: Circuit Board
5. C.B: Circuit Board

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Luminance & Audio I		
		C.B.A.		
		Integrated Circuits		
IC3001	AN6306		1	
IC3002	AN6327		1	
IC3003	AN6328		1	
IC3004	VCRS0004		1	
IC3005,3006	AN6326		2	
IC3007	AN6914		1	
IC3301	μPD4066BC or μPD4066C		1	
IC3302	MN4528B		1	
IC3003	VCR0019		1	
IC4001	AN6209		1	
		Transistors		
Q3001	2SD636 (P,Q,R)		1	
Q3002	2SB641 (P,Q,R)		1	
Q3003	2SD636 (P,Q,R)		1	
Q3004-3006	2SB641 (P,Q,R)		3	
Q3007,3008	2SC2206 (B,C)		2	
Q3009	2SD636 (P,Q,R)		1	
Q3010	2SB641 (P,Q,R)		1	
Q3011	2SC2206 (B,C)		1	
Q3012,3013	2SD636 (P,Q,R)		2	
Q3014,3015	2SD638		2	
Q3016	2SD661 (S,T)		1	
Q3017-3020	2SD638		4	
Q3021,3022	2SC2206 (B,C)		2	
Q3023	2SC2377 (C,D)		1	
Q3024,3025	2SC2206 (B,C)		2	
Q3026,3027	2SD636 (P,Q,R)		2	
Q3028	2SB643 (Q,R,S)		1	
Q3029-3034	2SD636 (P,Q,R)		6	
Q3035	2SB819		1	
Q3036	2SD636 (P,Q,R)		1	
Q3037	2SB819		1	
Q3038-3041	2SD636 (P,Q,R)		4	
Q3042	2SC2206 (B,C)		1	
Q3043	2SB641 (P,Q,R)		1	
Q3044,3045	2SC2377 (C,D)		2	
Q3046-3049	2SD636 (P,Q,R)		4	
Q3051	2SD636 (P,Q,R)		1	
Q3301	2SC2377 (C,D)		1	
Q3302	2SC2206 (B)		1	
Q3303	2SD636 (P,Q,R)		1	
Q3304	2SC2206 (B)		1	
Q3305-3309	2SD636 (P,Q,R)		5	
Q3311,3312	2SD636 (P,Q,R)		2	
Q4001,4002	2SD958 (R,S,T)		2	
Q4003	2SB788 (S,T)		1	
Q4004-4012	2SD636 (Q,R)		9	
Q4023,4024	2SD636 (Q,R)		2	
Q4025,4026	2SD973A		2	
Q4029	2SC1684 (Q,R) or 2SC1685 (Q,R)		1	
		Diodes		
D3001-3007	MA165 or 1SS119		7	
D3010-3018	MA165 or 1SS119		9	
D3019,3020	1SS86 or 1SS99		2	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
D3021	MA165 or		1		R3066	ERD10TJ393	39K	1	
	1SS119				R3067	ERD10TJ333	33K	1	
D3023	MA165 or		1		R3068	ERD10TJ471	470	1	
	1SS119				R3070	ERD10TJ564	560K	1	
D3024	1SS86 or		1		R3071	ERD10TJ100	10	1	
	1SS99				R3072	ERD10TJ222	2.2K	1	
D3025,3026	MA165 or		2		R3073,3074	ERD10TJ333	33K	2	
	1SS119				R3075	ERD10TJ103	10K	1	
D3301	OA90G		1		R3076	ERD10TJ222	2.2K	1	
D3302-3308	MA165 or		7		R3078	ERD10TJ222	2.2K	1	
	1SS119				R3079	EVN66AA00B23	Variable	2K	1
D4001-4005	MA165 or		5			or EVN52JA00B23			
	1SS119				R3080	ERD10TJ471	470	1	
D4011,4012	MA165 or		2		R3081	ERD10TJ102	1K	1	
	1SS119				R3082	EVN38CA00B23	Variable	2K	1
					R3083	ERD10TJ820	82	1	
					R3084	ERD10TJ392	3.9K	1	
		Resistors			R3085,3086	ERD10TJ561	560	2	
R3001,3002	ERD10TJ182	1.8K	2		R3087	ERD10TJ562	5.6K	1	
R3003	ERD10TJ223	22K	1		R3088	ERD10TJ223	22K	1	
R3004	ERD10TJ562	5.6K	1		R3089	ERD10TJ103	10K	1	
R3005	ERD10TJ104	100K	1		R3090	ERD10TJ392	3.9K	1	
R3006	ERD10TJ182	1.8K	1		R3091	ERD10TJ821	820	1	
R3007-3009	ERD10TJ562	5.6K	3		R3092	ERD10TJ333	33K	1	
R3010	ERD10TJ821	820	1		R3093	EVN38CA00B23	2K	1	
R3011	ERD10TJ472	4.7K	1		R3094	ERD10TJ473	47K	1	
R3012	ERD10TJ272	2.7K	1		R3095	ERD10TJ124	120K	1	
R3013	ERD10TJ681	680	1		R3097	ERD10TJ152	1.5K	1	
R3014	ERD10TJ332	3.3K	1		R3099	ERD10TJ473	47K	1	
R3015	ERD10TJ222	2.2K	1		R3100	ERD10TJ333	33K	1	
R3016	ERD10TJ682	6.8K	1		R3103	ERD10TJ100	10	1	
R3017	ERD10TJ392	3.9K	1		R3104,3105	ERD10TJ182	1.8K	2	
R3018	ERD10TJ223	22K	1		R3106	ERD10TJ473	47K	1	
R3019	EVN38CA00B54	Variable	50K	1	R3107	ERD10TJ152	1.5K	1	
R3020,3021	ERD10TJ333	33K	2		R3108	ERD10TJ100	10	1	
R3022	EVN38CA00B14	Variable	10K	1	R3109,3110	EVN38CA00B13	Variable	1K	2
R3023	ERD10TJ103	10K	1		R3111	ERD10TJ683	68K	1	
R3024	ERD10TJ102	1K	1		R3112	ERD10TJ152	1.5K	1	
R3025	ERD10TJ564	560K	1		R3113	ERD10TJ182	1.8K	1	
R3027	EVN66AA00B24	Variable	20K	1	R3114,3115	ERD10TJ391	390	2	
	or EVN52JA00B24				R3116	ERD10TJ331	330	1	
R3028	ERDS2TJ750	1/4W	75	1	R3117	ERD10TJ562	5.6K	1	
R3029,3030	ERD10TJ561	560	2		R3118	ERD10TJ151	150	1	
R3032	ERD10TJ563	56K	1		R3119	ERD10TJ102	1K	1	
R3033	ERD10TJ223	22K	1		R3120	ERD10TJ681	680	1	
R3034	EVN38CA00B54	Variable	50K	1	R3121	ERD10TJ102	1K	1	
R3035	EVN38CA00B24	Variable	20K	1	R3122,3123	ERD10TJ152	1.5K	2	
R3036	ERD10TJ473	47K	1		R3124,3125	ERD10TJ223	22K	2	
R3037	ERD10TJ223	22K	1		R3126	ERD10TJ103	10K	1	
R3038	ERD10TJ823	82K	1		R3127,3128	ERD10TJ152	1.5K	2	
R3039	ERD10TJ564	560K	1		R3129	ERD10TJ391	390	1	
R3040	ERD10TJ102	1K	1		R3130	ERD10TJ182	1.8K	1	
R3041	ERD10TJ222	2.2K	1		R3131	ERD10TJ561	560	1	
R3043	ERD10TJ102	1K	1		R3132	ERD10TJ152	1.5K	1	
R3044	ERD10TJ392	3.9K	1		R3133	ERD10TJ222	2.2K	1	
R3045	ERD10TJ331	330	1		R3135,3136	ERD10TJ152	1.5K	2	
R3046	ERD10TJ152	1.5K	1		R3137,3138	ERD10TJ103	10K	2	
R3049	ERD10TJ561	560	1		R3139-3141	ERD10TJ102	1K	3	
R3050	ERD10TJ560	56	1		R3142	ERDS1FJ560	1/2W	56	1
R3051	ERD10TJ680	68	1		R3143	ERD10TJ103	10K	1	
R3052,3053	ERD10TJ122	1.2K	2		R3144	ERD10TJ222	2.2K	1	
R3054	ERD10TJ101	100	1		R3145	ERD10TJ473	47K	1	
R3055	ERD10TJ562	5.6K	1		R3146	ERD10TJ683	68K	1	
R3057	ERD10TJ222	2.2K	1		R3147	ERD10TJ122	1.2K	1	
R3058	ERD10TJ223	22K	1		R3148	ERD10TJ100	10	1	
R3059	ERD10TJ103	10K	1		R3149,3150	EVJ51A007B15	Variable	100K	2
R3061	ERD10TJ102	1K	1		R3151	ERD10TJ471	470	1	
R3062	ERD10TJ222	2.2K	1		R3152	ERD10TJ102	1K	1	
R3063,3064	ERD10TJ122	1.2K	2		R3153	ERD10TJ561	560	1	
R3065	ERD10TJ151	150	1		R3155,3156	EVN38CA00B13	Variable	1K	2

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R3157	ERD10TJ100		10	1	R3314	ERD10TJ221		220	1
R3158,3159	ERD10TJ182		1.8K	2	R3315	ERD10TJ223		22K	1
R3160	ERD10TJ821		820	1	R3316	ERD10TJ393		39K	1
R3161	EVN38CA00B23	Variable	2K	1	R3317	ERD10TJ682		6.8K	1
R3162	ERD10TJ102		1K	1	R3318	ERD10TJ152		1.5K	1
R3163	ERD10TJ823		82K	1	R3319	ERD10TJ221		220	1
R3165	ERD10TJ683		68K	1	R3320	ERDS2TJ330	1/4W	330	1
R3166,3167	ERD10TJ104		100K	2	R3321	ERD10TJ272		2.7K	1
R3168,3169	ERD10TJ683		68K	2	R3322	ERDS2TJ331	1/4W	330	1
R3170	ERD10TJ104		100K	1	R3324	ERD10TJ222		2.2K	1
R3171	ERD10TJ223		22K	1	R3325	ERD10TJ471		470	1
R3172	ERD10TJ103		10K	1	R3326	ERD10TJ101		100	1
R3173	ERD10TJ223		22K	1	R3327	ERD10TJ221		220	1
R3174	ERD10TJ103		10K	1	R3328,3329	ERD10TJ124		120K	2
R3175	ERD10TJ152		1.5K	1	R3330	ERD10TJ222		2.2K	1
R3176,3177	ERD10TJ223		22K	2	R3331	ERD10TJ123		12K	1
R3178	ERD10TJ122		1.2K	1	R3332	ERD10TJ152		1.5K	1
R3179	ERD10TJ223		22K	1	R3333	ERD10TJ822		8.2K	1
R3180	ERD10TJ102		1K	1	R3334	ERD10TJ682		6.8K	1
R3181	ERD10TJ104		100K	1	R3335	ERD10TJ121		120	1
R3182	ERD10TJ224		220K	1	R3336	ERD10TJ561		560	1
R3183	ERD10TJ183		18K	1	R3337	ERD10TJ273		27K	1
R3184	ERD10TJ223		22K	1	R3338	ERD10TJ104		100K	1
R3185	ERD10TJ103		10K	1	R3339	ERD10TJ273		27K	1
R3186	ERD10TJ222		2.2K	1	R3340,3341	ERD10TJ104		100K	2
R3189,3190	ERD10TJ223		22K	2	R3342	ERD10TJ563		56K	1
R3191	ERD10TJ102		1K	1	R3343	ERD10TJ392		3.9K	1
R3192	ERD10TJ103		10K	1	R3344	ERD10TJ123		12K	1
R3193	ERD10TJ681		680	1	R3345	EVN38CA00B24	Variable	20K	1
R3194,3195	ERD10TJ152		1.5K	2	R3346	ERD10TJ123		12K	1
R3196	ERD10TJ333		33K	1	R3347	ERD10TJ104		100K	1
R3197	ERD10TJ153		15K	1	R3348	ERD10TJ124		120K	1
R3198	ERD10TJ103		10K	1	R3349	ERD10TJ332		3.3K	1
R3199	ERD10TJ472		4.7K	1	R3350	ERD10TJ393		39K	1
R3200,3201	ERD10TJ183		18K	2	R3351	EVN38CA00B54	Variable	50K	1
R3202,3203	ERD10TJ124		120K	2	R3352	ERD10TJ393		39K	1
R3204	ERD10TJ333		33K	1	R3353	ERD10TJ473		47K	1
R3205,3206	ERD10TJ272		2.7K	2	R3354	ERD10TJ104		100K	1
R3207	ERD10TJ102		1K	1	R3355,3356	ERD10TJ473		47K	2
R3208,3209	ERD10TJ151		150	2	R3357	ERD10TJ152		1.5K	1
R3210,3211	ERD10TJ333		33K	2	R3358	ERD10TJ223		22K	1
R3212,3213	ERD10TJ103		10K	2	R3359	ERD10TJ392		3.9K	1
R3214	ERD25TJ103	1/4W	10K	1	R3360	ERD25TJ392	1/4W	3.9K	1
R3215	ERD25TJ155	1/4W	1.5M	1	R4001	ERD10TJ392		3.9K	1
R3216	ERD10TJ223		22K	1	R4002	ERD10TJ332		3.3K	1
R3217	ERDS2TJ750	1/4W	75	1	R4003	ERD10TJ123		12K	1
R3218,3219	ERD10TJ333		33K	2	R4004	ERD10TJ821		820	1
R3220	ERD10TJ562		5.6K	1	R4005	ERD10TJ223		22K	1
R3221	ERD25TJ683	1/4W	68K	1	R4006	ERD10TJ392		3.9K	1
R3224	ERD10TJ683		68K	1	R4008-4010	ERD10TJ223		22K	3
R3226	ERD10TJ104		100K	1	R4012	ERD10TJ103		10K	1
R3227	ERD10TJ224		220K	1	R4013	ERD10TJ223		22K	1
R3228-3230	ERD10TJ333		33K	3	R4014	ERD10TJ104		100K	1
R3231	ERD10TJ561		560	1	R4015	ERD10TJ331		330	1
R3232	EVN38CA00B15	Variable	100K	1	R4016	ERD10TJ103		10K	1
R3233	ERD25TJ224	1/4W	220K	1	R4017,4018	ERD10TJ223		22K	2
R3236	ERD10TJ561		560	1	R4019	ERD10TJ103		10K	1
R3237,3238	ERD10TJ333		33K	2	R4021	ERD10TJ332		3.3K	1
R3239	ERD25VJ100	1/4W	10	1	R4022	ERD10TJ100		10	1
R3301	ERD10TJ183		18K	1	R4024	ERD10TJ271		270	1
R3302	ERD10TJ123		12K	1	R4025	ERD10TJ100		10	1
R3303	ERD10TJ330		33	1	R4026	ERD10TJ223		22K	1
R3304,3305	ERD10TJ472		4.7K	2	R4027	ERD10TJ183		18K	1
R3306	ERD10TJ563		56K	1	R4028	ERD10TJ102		1K	1
R3307	ERD10TJ471		470	1	R4029	EVN38CA00B24	Variable	20K	1
R3308	ERD10TJ562		5.6K	1	R4030	ERD10TJ822		8.2K	1
R3310	EVN38CA00B22	Variable	200	1	R4031	ERD10TJ333		33K	1
R3311	ERD10TJ683		68K	1	R4032	EVN38CA00B53	Variable	5K	1
R3312	ERD10TJ331		330	1	R4033	ERD10TJ124		120K	1
R3313	ERD10TJ101		100	1	R4034	ERD10TJ181		180	1

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R4035	ERD10TJ221		220	1	C3034	ECEA1HS010	Electrolytic 50V	1	1
R4036	ERD10TJ223		22K	1	C3035	ECCW1H151JC5	Ceramic 50V 150P	1	
R4037	ERD10TJ331		330	1		or ECCW1H151KC5			
R4038-4040	ERD10TJ223		22K	3	C3036,3037	ECEA1HS010	Electrolytic 50V	1	2
R4041,4042	ERD10TJ472		4.7K	2	C3038	ECCW1H121JC5	Ceramic 50V 120P	1	
R4043	EVN38CA00B54	Variable	50K	1	C3039	ECKW1H103ZF5	Ceramic 50V 0.01	1	
R4044	ERD10TJ272		2.7K	1	C3040	ECEA0JS470	Electrolytic 6.3V	47	1
R4045	ERD10TJ122		1.2K	1	C3041	ECCW1H181JC5	Ceramic 50V 180P	1	
R4048	ERD10TJ222		2.2K	1		or ECCW1H181KC5			
R4049	ERDS2TJ105		1/4W 1M	1	C3042	VCKW1H471JSA	Ceramic 50V 470P	1	
R4050	ERD10TJ333		33K	1	C3043	ECCW1H821J5	Ceramic 50V 820P	1	
R4052	ERD10TJ474		470K	1	C3045	ECEA0JS470	Electrolytic 6.3V	47	1
R4053	ERD10TJ181		180	1	C3046	ECCW1H820JC5	Ceramic 50V 82P	1	
R4054	ERD10TJ472		4.7K	1		or ECCW1H181KC5			
R4055	ERD10TJ271		270	1	C3047	ECCW1H181JC5	Ceramic 50V 180P	1	
R4056	ERD10TJ561		560	1		or ECCW1H181KC5			
R4071	ERD10TJ182		1.8K	1	C3048	ECEA0JS221	Electrolytic 6.3V	220	1
R4089	ERD10TJ103		10K	1	C3049	ECKW1H103ZF5	Ceramic 50V 0.01	1	
R4090	ERD10TJ223		22K	1	C3051	ECKW1H103ZF5	Ceramic 50V 0.01	1	
R4091	ERD10TJ103		10K	1	C3052	ECCW1H470JC5	Ceramic 50V 47P	1	
R4092	ERD10TJ223		22K	1		or ECCW1H470KC5			
R4093	ERD10TJ333		33K	1	C3053,3054	ECEA1HS010	Electrolytic 50V	1	2
R4094	ERDS2TJ4R7		1/4W 4.7	1	C3055	ECKW1H122KB5	Ceramic 50V 0.0012	1	
R4095	ERD10TJ333		33K	1	C3056	ECEA1HS010	Electrolytic 50V	1	1
R4096	ERDS2TJ4R7		1/4W 4.7	1	C3057	ECKW1H122KB5	Ceramic 50V 0.0012	1	
R4101	ERD25TJ223 or ERD25VJ223		1/4W 22K	1	C3058	ECEA0JS470	Electrolytic 6.3V	47	1
R4102	ERD25TJ104		1/4W 100K	1	C3059	ECEA1CS470	Electrolytic 16V	47	1
R4103	ERD25TJ821		1/4W 820	1	C3060	ECKW1H102ZF5	Ceramic 50V 0.001	1	
R4104	ERD25TJ332		1/4W 3.3K	1	C3061	ECKW1H103ZF5	Ceramic 50V 0.01	1	
R4105	ERD10TJ821		820	1	C3062	ECKW1H331KB5	Ceramic 50V 330P	1	
R4106	ERGLANJ100	Metal Oxide	1W 10	1	C3063	ECCW1H680JC5	Ceramic 50V 68P	1	
						or ECCW1H680KC5			
					C3064	ECKW1H103ZF5	Ceramic 50V 0.01	1	
					C3065	ECEA1CS470	Electrolytic 16V	47	1
					C3066,3067	VCTW1C104MX	Ceramic 16V 0.1	2	
					C3068,3069	ECEA1CK100	Electrolytic 16V	10	2
					C3070	ECEA0JS5221	Electrolytic 6.3V	220	1
		Capacitors			C3071,3072	ECEA1CS470	Electrolytic 16V	47	2
C3001	ECKW1H103ZF5	Ceramic 50V 0.01	1		C3073	ECEA0JK470	Electrolytic 6.3V	47	1
C3002	VCTW1C104MX	Ceramic 16V 0.1	1		C3074	ECEA1CK100	Electrolytic 16V	10	1
C3003	ECCW1H151JC5	Ceramic 50V 150P	1		C3075	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C3004	ECCW1H270JC5 or ECCW1H270KC5	Ceramic 50V 27P	1		C3076,3077	ECV1ZW60X64	Trimmer 60P	2	
C3005	ECCW1H103ZF5	Ceramic 50V 0.01	1		C3078	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C3006	ECCW1H121JC5	Ceramic 50V 120P	1		C3079	ECEA1CK100	Electrolytic 16V	10	1
C3007	ECKW1H271KB5	Ceramic 50V 270P	1		C3080	ECEA0JK470	Electrolytic 6.3V	47	1
C3008	ECEA1HS010	Electrolytic 50V	1	1	C3081-3084	ECKW1H103ZF5	Ceramic 50V 0.01	4	
C3009	ECEA0JS101	Electrolytic 6.3V	100	1	C3085	ECKW1H561KB5	Ceramic 50V 560P	1	
C3010	ECEA1HS2R2	Electrolytic 50V	2.2	1		or VCKW1H561JSA			
C3012	ECKW1H103ZF5	Ceramic 50V 0.01	1		C3086	ECCW1H680JC5	Ceramic 50V 68P	1	
C3013	ECCW1H121JC5	Ceramic 50V 120P	1			or ECCW1H680KC5			
C3014	ECCW1H390JC5	Ceramic 50V 39P	1		C3087	ECCW1H431J5	Ceramic 50V 430P	1	
C3015	ECEA0JS470	Electrolytic 6.3V	47	1		or VCKW1H431JSA			
C3016	ECKW1H103ZF5	Ceramic 50V 0.01	1		C3088	ECCW1H221JC5	Ceramic 50V 220P	1	
C3017	ECQV05334JZ	Polyester 50V 0.33	1		C3089	ECCW1H560JC5	Ceramic 50V 56P	1	
C3018	ECKW1H103ZF5	Ceramic 50V 0.01	1			or ECCW1H560KC5			
C3019	ECKW1H103ZF	Ceramic 50V 0.01	1		C3090	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C3020	ECCW1H150JC5 or ECCW1H150KC5	Ceramic 50V 15P	1		C3092,3093	ECEA1CS470	Electrolytic 16V	47	2
C3021	ECKW1H103ZF5	Ceramic 50V 0.01	1		C3094	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C3022	ECEA0JS470	Electrolytic 6.3V	47	1	C3095	ECEA0JK470	Electrolytic 6.3V	47	1
C3023	ECCW1H820JC5 or ECCW1H820KC5	Ceramic 50V 82P	1		C3096	ECEA1CK100	Electrolytic 16V	10	1
C3024,3025	ECKW1H222ZF5	Ceramic 50V 0.0022	2		C3097	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C3026-3028	ECKW1H103ZF5	Ceramic 50V 0.01	3		C3098,3099	ECV1ZW60X64	Trimmer 60P	2	
C3029	ECCW1H470JC5	Ceramic 50V 47P	1		C3100	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C3030	VCT25473KX	Semiconductor 25V 0.047	1		C3101	ECEA1CK100	Electrolytic 16V	10	1
C3031	ECKW1H821KB	Ceramic 50V 820P	1		C3102	ECEA0JK470	Electrolytic 6.3V	47	1
C3032	ECEA1HS2R2	Electrolytic 50V	2.2	1	C3103	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C3033	ECEA1ES4R7	Electrolytic 25V	4.7	1	C3104	ECEA1AS471	Electrolytic 10V	470	1
					C3105	ECEA1CS470	Electrolytic 16V	47	1
					C3106	ECEA0JS470	Electrolytic 6.3V	47	1
					C3107	ECKW1H103ZF5	Ceramic 50V 0.01	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
C3108-3111	ECCW1H150JC5 or ECCW1H150KC5	Ceramic 50V 15P	4			or VCKW1H821JSA			
C3112	ECEA0JS470	Electrolytic 6.3V 47	1		C4002	ECEA1ES3R3	Electrolytic 25V 3.3	1	
C3113	ECCW1H560JC5 or ECCW1H560KC5	Ceramic 50V 56P	1		G4003,4004	ECEA1CS330	Electrolytic 16V 33	2	
C3114	ECKW1H103ZF5	Ceramic 50V 0.01	1		C4005	ECEA1CS100	Electrolytic 16V 10	1	
C3115	ECCW1H270JC5 or ECCW1H270KC5	Ceramic 50V 27P	1		C4008	ECQV05473JZ	Polyester 50V 0.047	1	
C3116-3121	ECKW1H103ZF5	Ceramic 50V 0.01	6		C4009	ECEA50ZR15	Electrolytic 50V 0.15	1	
C3122	ECCW1H101JC5 or ECCW1H101KC5	Ceramic 50V 100P	1		C4010	ECQV05823JZ	Polyester 50V 0.082	1	
C3123	ECKW1H103ZF5	Ceramic 50V 0.01	1		C4011	ECEA1HS010	Electrolytic 50V 1	1	
C3124	ECCW1H470JC5 or ECCW1H470KC5	Ceramic 50V 47P	1		C4012	ECEA1CS220	Electrolytic 16V 22	1	
C3125	ECEA1CS100	Electrolytic 16V 10	1		C4013	ECEA1CS100	Electrolytic 16V 10	1	
C3126	ECKW1H103ZF5	Ceramic 50V 0.01	1		C4014	ECKW1H102ZF5	Ceramic 50V 0.001	1	
C3128	ECEA1HS010	Electrolytic 50V 1	1		C4015	ECEA1ES4R7	Electrolytic 25V 4.7	1	
C3129	ECEA1CS100	Electrolytic 16V 10	1		C4016	ECKW1H471KB5	Ceramic 50V 470P	1	
C3130	ECCW1H470JC5 or ECCW1H470KC5	Ceramic 50V 47P	1		C4017	ECQV05333JZ	Polyester 50V 0.033	1	
C3131	ECKW1H103ZF	Ceramic 50V 0.01	1		C4018	ECEA1CS470	Electrolytic 16V 47	1	
C3132	ECKW1H103ZF5	Ceramic 50V 0.01	1		C4019,4020	ECEA50ZR22	Electrolytic 50V 0.22	2	
C3133	ECEA1HS010	Electrolytic 50V 1	1		C4022,4023	ECEA1CS100	Electrolytic 16V 10	2	
C3134	ECKW1H103ZF	Ceramic 50V 0.01	1		C4024	ECEA50ZR33	Electrolytic 50V 0.33	1	
C3135	ECEA1CS470	Electrolytic 16V 47	1		C4025	ECEA50ZR22	Electrolytic 50V 0.22	1	
C3136,3137	ECKW1H103ZF5	Ceramic 50V 0.01	2		C4027	ECEA1CS100	Electrolytic 16V 10	1	
C3138	VCY25473KX	Semiconductor 25V 0.047	1		C4028	ECEA1CS101	Electrolytic 16V 100	1	
C3141	ECKW1H103ZF	Ceramic 50V 0.01	1		C4030	ECEA1ES3R3	Electrolytic 25V 3.3	1	
C3142	ECCW1H270JC5 or ECCW1H270KC5	Ceramic 50V 27P	1		C4035	ECKW1H102ZF5	Ceramic 50V 0.001	1	
C3145	ECCW1H180KC	Ceramic 50V 18P	1		C4036	ECEA1CS101	Electrolytic 16V 100	1	
C3146	ECKW1H103ZF	Ceramic 50V 0.01	1		C4037	ECEA1CS330	Electrolytic 16V 33	1	
C3301	ECEA1CS470	Electrolytic 16V 47	1		C4053	ECQM1H103KZ	Polyester 50V 0.01	1	
C3302	ECKW1H103ZF5	Ceramic 50V 0.01	1		G4054	ECQV05333JZ	Polyester 50V 0.033	1	
C3303	ECCW1H121JC5 or ECCW1H121KC5	Ceramic 50V 120P	1		C4055	ECEA1ES3R3	Electrolytic 25V 3.3	1	
C3304	ECCW1H470JC5 or ECCW1H470KC5	Ceramic 50V 47P	1		C4056	ECQM1H103KZ	Polyester 50V 0.01	1	
C3305	ECCW1H080CC5 or ECCW1H080DC5	Ceramic 50V 8P	1		C4057	ECQV05333JZ	Polyester 50V 0.033	1	
C3306	ECCW1H220JC5 or ECCW1H220KC5	Ceramic 50V 22P	1		C4058	ECEA1ES3R3	Electrolytic 25V 3.3	1	
C3307	ECKW1H103ZF5	Ceramic 50V 0.01	1		C4059	ECQF2223KZ	Polyester 200V 0.022	1	
C3308	ECCW1H470JC5 or ECCW1H470KC5	Ceramic 50V 47P	1		C4060	ECQF6152KZ	Polyester 630V0.0015	1	
C3309	ECEA1CS470	Electrolytic 16V 47	1		C4061	ECRBC070M11	Trimmer 70P	1	
C3310-3312	ECKW1H103ZF5	Ceramic 50V 0.01	3		C4064	ECKW1H102ZF5	Ceramic 50V 0.001	1	
C3313	VCY25223KX	Ceramic 25V 0.022	1		C4065	ECKW1H561KB5	Ceramic 50V 560P	1	
C3314	ECKW1H103ZF5	Ceramic 50V 0.01	1		C4066	ECEA1CS100	Electrolytic 16V 10	1	
C3315	ECCW1H680JC5	Ceramic 50V 68P	1		C4067	ECKW1H561KB5	Ceramic 50V 560P	1	
C3316	ECKW1H331KB5	Ceramic 50V 330P	1		C4068	ECRBC070M11	Trimmer 70P	1	
C3317	ECEA1AS470	Electrolytic 10V 47	1		C4069,4070	ECEA1ES3R3	Electrolytic 25V 3.3	2	
C3318,3319	ECCW1H150JC5 or ECCW1H150KC5	Ceramic 50V 15P	2		C4071	ECEA1ES4R7	Electrolytic 25V 4.7	1	
C3320	ECEA0JS101	Electrolytic 6.3V 100	1		C4072	ECQM1H562KZ	Polyester 50V 0.0056	1	
C3321	ECEA1CS470	Electrolytic 16V 47	1						
C3322	ECKW1H103ZF5	Ceramic 50V 0.01	1				Delay Lines		
C3323,3324	ECEA1CS470	Electrolytic 16V 47	2		DL3001	EPDEN645A12K		1	
C3325	ECCW1H181JC5 or ECCW1H181KC5	Ceramic 50V 180P	1		DL3301	or VLD0022 EPDON325E02C or VLD80002		1	
C3326	ECEA0JS101	Electrolytic 6.3V 100	1						
C3327,3328	VCY25473KX	Semiconductor 25V 0.047	2				Filters		
C3329	ECKW1H103ZF5	Ceramic 50V 0.01	1		FL3001	ELB5G002		1	
C3330	ECEA1CS470	Electrolytic 16V 47	1		FL3002	ELB5F008		1	
C3331	ECEA1HS010	Electrolytic 50V 1	1		FL3005	VLP0136		1	
C3332,3333	ECKW1H103ZF5	Ceramic 50V 0.01	2						
C3334	ECCW1H180JC5 or ECCW1H180KC5	Ceramic 50V 18P	1				Coils		
C3335	ECKW1H821KB5	Ceramic 50V 820P	1		L3001,3002	VLQS66F101K	100 μ H	2	
					L3005	VLQS66F680K	68 μ H	1	
					L3006	VLQS66F181K	180 μ H	1	
					L3007	VLQS66F820K	82 μ H	1	
					L3008-3010	VLQS66F101K	100 μ H	3	
					L3017,3018	VLQS66F100K	10 μ H	2	
					L3019	VLQS66F471K	470 μ H	1	
					L3020,3021	VLQ80W102K	1mH	2	
					L3022,3023	VLQS66F101K	100 μ H	2	
					L3024	VLQS66F680K	68 μ H	1	
					L3025	VLQS66F151K	150 μ H	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
L3026	VLQS66F101K	100μH	1				Miscellaneous		
L3027	VLQS66F151K	150μH	1			TMM6425	Clamper	1	
L3028	VLQS66F470K	47μH	1			VEKS0664	Lug Ass'y	1	
L3029	VLQS66F101K	100μH	1			VEKS0889	Lug Ass'y	1	
L3030	VLQS66F8R2K	8.2μH	1			VEKS0941	Lug Ass'y	1	
L3031,3032	VLQS66F820K	82μH	2			VMTS0018	Cushion	1	
L3034	VLQS66F101K	100μH	1			VSCS0138	Head Amp Shield Case	1	
L3035	VLQS66F220K	22μH	1			VSCS0139	Head Amp Shield Case	1	
L3036	VLQS66F390K	39μH	1			VSCS0141	1/2 Skew Shield Case	1	
L3037,3038	VLQS66F101K	100μH	2			VSCS0142	1/2 Skew Shield Case	1	
L3301-3303	VLQS66F101K	100μH	3			VSCS0143	1/2 Skew Shield Case	1	
L3304	VLQS66F470K	47μH	1			VSCS0144	Head Amp Shield Case	1	
L3305	VLQS66F101K	100μH	1						
L3306,3307	VLQS66F2R2K	2.2μH	2						
L3308	VLQS66F120K	12μH	1						
L3309	VLQS66F330K	33μH	1						
L3310	VLQS66F820K	82μH	1						
L3311	VLQS66F8R2K	8.2μH	1						
L3312	VLQS66F101K	100μH	1						
L4001,4002	VLQ00W222K	2.2mH	2						
L4003	VLQS66F101K	100μH	1						
L4004	VLQ00W102K	1mH	1						
		Crystal Oscillator							
X3301	VSX0070		1						
		Pin Headers							
P3001	VJPS1142	3P	1						
P3002	VJPS1143	5P	1						
P3003	VJPS1142	3P	1						
P3004	VJPS1145	8P	1						
P3008	VJPS1147	12P	1						
P3010	VJPS1142	3P	1						
P3012	VJPS1143	5P	1				Servo.Slow.Still & Chrominance C.B.A.		
P3013	VJPS1146	10P	1						
P4001	VJPS1142	3P	1						
P4002	VJPS1144	6P	1						
P4003,4004	VJPS1141	2P	2				Integrated Circuits		
P4005	VJPS1144	6P	1		IC2001	AN6347		1	
P4006	VJPS1143	5P	1		IC2002	AN6562 or		1	
P4007	VJPS1145	8P	1			μPC358C			
P4008	VJPS1141	2P	1		IC2003	AN6677		1	
P4009	VJPS1142	3P	1		IC2004	MN6165VAA		1	
					IC2005	AN640C		1	
					IC2006	AN6346		1	
					IC2007	AN6562 or		1	
		Switch				μPC358C			
SW3001	VSS0053	Select SW	1		IC2008	VCRS0006		1	
					IC2009	AN6912 or		1	
						μPC339C			
					IC2010	AN7806 or		1	
		Relay				HA17806P			
RL3001	VSYS0002		1		IC2011	μPD1511C-074		1	
					IC2012	STA321A		1	
					IC2013	STA311A		1	
					IC8001	AN6360		1	
					IC8002	AN6361N		1	
					IC8003	AN6362		1	
		Transformers							
T4001	VLTO118		1						
T4002	VLTO116A		1						
							Transistors		
					Q2001-2007	2SD636(Q,R,S)		7	
					Q2008-2010	2SB641(Q,R,S)		3	
					Q2011	2SD636(Q,R,S)		1	
					Q2012-2015	2SB641(Q,R,S)		4	
					Q2016	2SD636(Q,R,S)		1	
					Q2017	2SB641(Q,R,S)		1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
Q2018	2SD889(Q,R)		1		R2028	ERD10TJ124	120K	1	
Q2019-2022	2SD636(Q,R,S)		4		R2029	ERD10TJ154	150K	1	
Q2023,2024	2SB641(Q,R,S)		2		R2030	ERD10TJ272	2.7K	1	
Q2025-2036	2SD636(Q,R,S)		12		R2032	ERD10TJ103	10K	1	
Q2039	2SD636(Q,R,S)		1		R2033	ERD10TJ333	33K	1	
Q2042	2SD636(Q,R,S)		1		R2034	ERD10TJ224	220K	1	
Q2045-2047	2SD636(Q,R,S)		3		R2035,2036	ERD10TJ103	10K	2	
Q2049	2SD636(Q,R,S)		1		R2037	ERD10TJ333	33K	1	
Q2051-2053	2SD636(Q,R,S)		3		R2038	ERD10TJ683	68K	1	
Q2054	2SB641(Q,R,S)		1		R2039	ERD10TJ104	100K	1	
Q2055-2057	2SD636(Q,R,S)		3		R2040	ERD10TJ332	3.3K	1	
Q2058,2059	2SB641(Q,R,S)		2		R2041	ERD10TJ124	120K	1	
Q2060	2SD636(Q,R,S)		1		R2042	EROS2TKG6802	Precision Metal Film	1	
Q8001	2SC2206(B,C)		1				1/4W 68K		
Q8002	2SD636(Q,R,S)		1		R2043	EROS2TKG1202	Precision Metal Film	1	
Q8003	2SC2206(B,C)		1				1/4W 12K		
Q8005	2SB641(Q,R,S)		1		R2044	ERD10TJ563	56K	1	
Q8006-8010	2SD636(Q,R,S)		5		R2045	EROS2TKG1002	Precision Metal Film	1	
Q8013	2SD636(Q,R,S)		1				1/4W 10K		
					R2046	ERD10TJ103	10K	1	
					R2047-2049	ERDS2TJ220	1/4W 22	3	
					R2050	ERX12ANJR68H	Metal Oxide 1/2W 0.68	1	
		Diodes			R2051	ERD10TJ124	120K	1	
D2001-2013	MA165		13		R2052	ERD10TJ104	100K	1	
	or 1SS119				R2053	ERD10TJ103	10K	1	
D2014	EQA02-06(C,D,E)	Zener	1		R2054	ERD10TJ683	Fuse 1W 6.8	1	⚠
	or RD6.2EB				R2055	ERD10TJ332	3.3K	1	
D2015-2019	MA165		5		R2056	ERD10TJ153	15K	1	
	or 1SS119				R2057	ERD10TJ473	47K	1	
D2020-2022	EM1Z		3		R2058	ERD10TJ223	22K	1	
	or ERB12-01				R2059	ERD10TJ224	220K	1	
D2023-2029	MA165		7		R2060	ERD10TJ104	100K	1	
	or 1SS119				R2061	ERD10TJ473	47K	1	
D2030	EQA02-07(C,D)	Zener	1		R2062	ERD10TJ562	5.6K	1	
	or RD7.5EB				R2063	ERD10TJ104	100K	1	
D2032-2035	MA165		4		R2064	ERD10TJ223	22K	1	
	or 1SS119				R2065	ERD10TJ104	100K	1	
D2037-2039	MA165		3		R2066	ERD10TJ153	15K	1	
	or 1SS119				R2067	ERD10TJ474	470K	1	
D8001-8005	MA165		5		R2068-2070	ERD10TJ103	10K	3	
	or 1SS119				R2071	ERD10TJ184	180K	1	
D8009	MA165		1		R2072	ERD10TJ682	6.8K	1	
	or 1SS119				R2073	ERD10TJ154	150K	1	
					R2074,2075	ERD10TJ393	39K	2	
					R2076	ERD10TJ563	56K	1	
					R2077	ERD10TJ471	470	1	
		Resistors			R2078	ERD10TJ104	100K	1	
R2001	ERD10TJ224	220K	1		R2079	ERD10TJ102	1K	1	
R2002	ERD10TJ104	100K	1		R2080	ERD10TJ472	4.7K	1	
R2003	ERD10TJ473	47K	1		R2081	ERD10TJ102	1K	1	
R2004	ERD10TJ562	5.6K	1		R2082	ERD10TJ103	10K	1	
R2005	ERD10TJ473	47K	1		R2083	ERDS1TJ820	1/2W 82	1	
R2006	ERD10TJ563	56K	1		R2084	ERGIANJ151H	Metal Oxide 1W 150	1	
R2007	ERD10TJ473	47K	1		R2085	ERD10TJ103	10K	1	
R2008	ERD10TJ823	82K	1		R2086	ERD10TJ471	470	1	
R2009	ERD10TJ223	22K	1		R2087	ERGIANJ151H	Metal Oxide 1W 150	1	
R2010	ERD10TJ563	56K	1		R2088,2089	ERD10TJ103	10K	2	
R2011	ERD10TJ153	15K	1		R2090	ERDS1TJ820	1/2W 82	1	
R2012	ERD10TJ104	100K	1		R2091	ERD10TJ103	10K	1	
R2013	ERD10TJ473	47K	1		R2092	ERDS1TJ820	1/2W 82	1	
R2014,2015	ERD10TJ104	100K	2		R2093,2094	ERD10TJ471	470	2	
R2016	ERD10TJ332	3.3K	1		R2095	ERD10TJ563	56K	1	
R2017	ERD10TJ103	10K	1		R2096	ERXIANJR82H	Metal Oxide 1W 0.82	1	
R2018	ERD10TJ104	100K	1		R2097	ERD10TJ472	4.7K	1	
R2019	ERD10TJ333	33K	1		R2098-2100	ERD10TJ104	100K	3	
R2020-2022	ERD10TJ104	100K	3		R2101-2103	ERDS2TJ151	1/4W 150	3	
R2023	ERD10TJ222	2.2K	1		R2104	ERD10TJ103	10K	1	
R2024,2025	ERD10TJ104	100K	2		R2105	ERD10TJ224	220K	1	
R2026	ERD10TJ154	150K	1		R2106	ERD10TJ104	100K	1	
R2027	ERD10TJ333	33K	1		R2107	ERD10TJ123	12K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R2108	ERD10TJ122		1.2K 1		R2181	ERD10TJ183		18K 1	
R2109	ERD10TJ470		47 1		R2182	ERD10TJ563		56K 1	
R2110, 2111	ERD10TJ103		10K 2		R2183	ERD10TJ223		22K 1	
R2112	ERD10TJ681		680 1		R2184	ERD10TJ273		27K 1	
R2113	ERD10TJ102		1K 1		R2185, 2186	ERD10TJ104		100K 2	
R2114	ERD10TJ332		3.3K 1		R2187	ERD10TJ103		10K 1	
R2115	ERD10TJ223		22K 1		R2188, 2189	ERD10TJ823		82K 2	
R2116, 2117	ERD10TJ682		6.8K 2		R2190, 2191	EVN38CA00B15	Variable	100K 2	
R2118, 2119	EVN38CA00B54	Variable	50K 2		R2192	ERD10TJ223		22K 1	
R2120	EVN66AA00B15	Variable	100K 1		R2193	ERD10TJ124		120K 1	
R2121	ERD10TJ103		10K 1		R2194	ERD10TJ222		2.2K 1	
R2122	ERD10TJ223		22K 1		R2195	ERD10TJ101		100 1	
R2123-2125	ERD10TJ104		100K 3		R2196	ERGLANJ151H	Metal Oxide 1W	150 1	
R2126	ERD10TJ473		47K 1		R2197	ERD10TJ103		10K 1	
R2127	ERD10TJ272		2.7K 1		R2198, 2199	ERD10TJ104		100K 2	
R2128	ERD10TJ104		100K 1		R2201	ERD25TJ155	1/4W	1.5K 1	
R2129	EVN38CA00B24	Variable	20K 1		R2202	ERD10TJ332		3.3K 1	
R2130	ERD10TJ562		5.6K 1		R2203	ERD10TJ392		3.9K 1	
R2131	EVN38CA00B24	Variable	20K 1		R2204	ERD10TJ103		10K 1	
R2132, 2133	ERD10TJ103		10K 2		R2205	ERD10TJ104		100K 1	
R2134	ERD10TJ473		47K 1		R2206	ERD10TJ223		22K 1	
R2135	ERD10TJ104		100K 1		R2207	ERD25TJ223	1/4W	22K 1	
R2136	ERD10TJ103		10K 1		R2208	ERD10TJ104		100K 1	
R2137	EROS2TKG5602	Precision Metal Film	1		R2209	ERD10TJ473		47K 1	
		1/4W	56K		R2210	ERD10TJ124		120K 1	
R2138	EROS2TKG1002	Precision Metal Film	1		R2211	ERD10TJ102		1K 1	
		1/4W	10K		R2212, 2213	ERD10TJ333		33K 2	
R2139	EROS2TKG3301	Precision Metal Film	1		R2214	ERD10TJ104		100K 1	
		1/4W	3.3K		R2215	ERD10TJ102		1K 1	
R2140	ERD10TJ104		100K 1		R2216	ERD10TJ104		100K 1	
R2141	EROS2TKG8200	Precision Metal Film	1		R2217	ERD10TJ223		22K 1	
		1/4W	820		R2218	ERD10TJ822		8.2K 1	
R2142	EROS2TKG4700	Precision Metal Film	1		R2219	ERD10TJ334		330K 1	
		1/4W	470		R2220	ERD10TJ824		820K 1	
R2143	ERD10TJ563		56K 1		R2221	ERD10TJ183		18K 1	
R2144	ERD10TJ222		2.2K 1		R2222	ERD10TJ473		47K 1	
R2145	ERD10TJ333		33K 1		R2223	ERD10TJ103		10K 1	
R2146	ERD10TJ103		10K 1		R2224	ERD10TJ221		220 1	
R2147, 2148	ERD10TJ104		100K 2		R2225, 2226	ERD10TJ473		47K 2	
R2149	ERD10TJ683		68K 1		R2227	ERD10TJ333		33K 1	
R2150	ERDS2TJ100		1/4W 10 1		R2228	ERD10TJ473		47K 1	
R2151	ERD10TJ473		47K 1		R2229	ERD10TJ104		100K 1	
R2152	ERD10TJ104		100K 1		R2230	ERD10TJ333		33K 1	
R2153	ERD10TJ563		56K 1		R2231	ERD10TJ473		47K 1	
R2154	ERD10TJ183		18K 1		R2233	ERD10TJ223		22K 1	
R2155	ERD10TJ124		120K 1		R2236	ERD10TJ102		1K 1	
R2156	EVLVOUA00B15	Variable	100K 1		R2237, 2238	ERD10TJ224		220K 2	
R2157	ERD10TJ223		22K 1		R2239, 2240	ERD10TJ183		18K 2	
R2158	EVLVOUA00B15	Variable	100K 1		R2241, 2242	ERD25TJ104	1/4W	100K 2	
R2159	ERD10TJ473		47K 1		R2243	ERD25TJ224	1/4W	220K 1	
R2160	EVN38CA00B15	Variable	100K 1		R8001	ERD10TJ563		56K 1	
R2161	ERD10TJ102		1K 1		R8002	ERD10TJ102		1K 1	
R2162	ERD10TJ103		10K 1		R8003	ERD10TJ103		10K 1	
R2163	ERD10TJ223		22K 1		R8004	ERD10TJ680		68 1	
R2164	ERD10TJ103		10K 1		R8005, 8006	ERD10TJ122		1.2K 2	
R2165	ERDS2TJ105		1/4W 1M 1		R8007	ERD10TJ152		1.5K 1	
R2166	ERD10TJ223		22K 1		R8008	ERD10TJ183		18K 1	
R2167	ERD10TJ103		10K 1		R8010, 8011	ERDS2TJ105	1/4W	1M 2	
R2168	ERDS2TJ105		1/4W 1M 1		R8012	ERD10TJ102		1K 1	
R2169, 2170	ERD10TJ223		22K 2		R8013	ERD10TJ271		270 1	
R2171	ERD10TJ391		390 1		R8014	ERD10TJ102		1K 1	
R2172	ERD10TJ223		22K 1		R8015, 8016	ERD10TJ122		1.2K 2	
R2173	ERD10TJ471		470 1		R8017	ERD10TJ102		1K 1	
R2174	ERD10TJ391		390 1		R8018	EVN66AA00B23	Variable	2K 1	
R2175	ERD10TJ223		22K 1			or EVN52JA00B23			
R2176	ERD10TJ471		470 1		R8020	EVN38CA00B23	Variable	2K 1	
R2177	ERD10TJ104		100K 1		R8021	EVN38CA00B53	Variable	5K 1	
R2178	ERD10TJ103		10K 1		R8022, 8023	ERD10TJ391		390 2	
R2179	ERD10TJ223		22K 1		R8025, 8026	ERD10TJ391		390 2	
R2180	ERD10TJ103		10K 1		R8027	ERD10TJ104		100K 1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R8028	ERD10TJ224	220K	1		C2035,2036	ECQM1H103KZ	Polyester 50V 0.01	2	
R8029	ERD10TJ182	1.8K	1		C2037-2039	ECEA50ZR33	Electrolytic 50V 0.33	3	
R8030	ERDS1FJ121	1/2W 120	1		C2040	ECEA1HS010	Electrolytic 50V	1	1
R8031	ERD10TJ562	5.6K	1		C2041	ECQV05104JB	Polyester 50V 0.1	1	
R8032	ERD10TJ222	2.2K	1		C2042	ECEA1HS2R2	Electrolytic 50V 2.2	1	
R8033	ERDS2TJ334	1/4W 330K	1		C2043	ECKW1H103ZF5	Ceramic 50V 0.01	1	
R8035	ERD10TJ392	3.9K	1		C2044	ECEA1CS100	Electrolytic 16V 10	1	
R8036	ERD10TJ182	1.8K	1		C2045,2046	ECQM1H683KV	Polyester 50V 0.068	2	
R8037	ERD10TJ472	4.7K	1			or ECQM1H683KZ			
R8038	ERD10TJ821	820	1		C2047	ECQV05224JZ	Polyester 50V 0.22	1	
R8039	ERD10TJ822	8.2K	1		C2048	ECEA1HS010	Electrolytic 50V	1	1
R8041	ERD10TJ222	2.2K	1		C2049	ECKW1H182KB5	Ceramic 50V 0.0018	1	
R8042	ERDS2TJ681	1/4W 680	1		C2050	ECEA1CS100	Electrolytic 16V 10	1	
R8043	EVNK6AA00B52	Variable	500	1	C2051	ECQM1H273KV	Polyester 50V 0.027	1	
	or EVN52JA00B52					or ECQM1H273KZ			
R8044	ERD10TJ122	1.2K	1		C2052	ECEA0JS470	Electrolytic 6.3V 47	1	
R8045	ERD10TJ682	6.8K	1		C2053	ECEA0JS221	Electrolytic 6.3V 220	1	
R8046	ERD10TJ332	3.3K	1		C2054	ECQM1H153KZ	Polyester 50V 0.015	1	
R8047	ERD10TJ103	10K	1		C2055	ECEA1CS220	Electrolytic 16V 22	1	
R8048	ERD10TJ562	5.6K	1		C2056	ECEA1HS010	Electrolytic 50V	1	1
R8050	ERD10TJ472	4.7K	1		C2057	ECEA1AS470	Electrolytic 10V 47	1	
R8052	ERD10TJ103	10K	1		C2058,2059	ECKW1H103ZF5	Ceramic 50V 0.01	2	
R8055	ERD10TJ473	47K	1		C2060,2061	ECEA50ZR68	Electrolytic 50V 0.68	2	
R8056	ERD10TJ562	5.6K	1		C2062	ECEA1CS470	Electrolytic 16V 47	1	
R8057	ERD10TJ103	10K	1		C2063	ECQV05274JZ	Polyester 50V 0.27	1	
R8058	ERD10TJ183	18K	1		C2064,2065	ECEA1HS010	Electrolytic 50V	1	2
R8059	ERD10TJ821	820	1		C2066	ECEA1ES4R7	Electrolytic 25V 4.7	1	
R8060	ERD10TJ182	1.8K	1		C2067	ECKW1H102KB5	Ceramic 50V 0.001	1	
R8062	ERD10TJ182	1.8K	1		C2068	ECQV05823JB	Polyester 50V 0.082	1	
R8063,8064	ERD10TJ103	10K	2		C2069	ECEA1HS010	Electrolytic 50V	1	1
R8065,8066	ERD10TJ473	47K	2		C2070	ECEA50Z2R2	Electrolytic 50V 2.2	1	
R8067	ERD10TJ123	12K	1		C2071	ECQV05104JB	Polyester 50V 0.1	1	
R8068	ERD10TJ561	560	1		C2072	ECEA1CS100	Electrolytic 16V 10	1	
					C2073,2074	ECCF1H220K	Ceramic 50V 22P	2	
						or ECCF1H220KC			
					C2076,2077	ECKF1H102KB	Ceramic 50V 0.001	2	
					C2078	ECEA1CS470	Electrolytic 16V 47	1	
					C2079	ECKW1H102KB5	Ceramic 50V 0.001	1	
					C2080	ECEA10Z47	Electrolytic 50V 47	1	
						or ECEA16Z47	Electrolytic 16V 47		
C2001	ECQM1H823KV	Polyester 50V 0.082	1		C8001	ECKW1H182KB5	Ceramic 50V 0.001	1	
	or ECQM1H823KZ				C8002-8004	ECKW1H103ZF5	Ceramic 50V 0.01	3	
C2002	ECQM1H223KZ	Polyester 50V 0.022	1		C8005	ECEA1CS470	Electrolytic 16V 47	1	
C2003	ECEA0JS470	Electrolytic 6.3V 47	1		C8006	ECCW1H121JC5	Ceramic 50V 120P	1	
C2004	ECEA1HN010S	Electrolytic 50V	1	1	C8007	ECEA1HS010	Electrolytic 50V	1	1
C2005	ECEA1CN100S	Electrolytic 16V 10	1		C8008	ECEA1ES4R7	Electrolytic 25V 4.7	1	
C2006	ECQM1H562KZ	Polyester 50V 0.0056	1		C8009	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C2007	ECQV05104JB	Polyester 50V 0.1	1		C8010	ECCW1H680JC5	Ceramic 50V 68P	1	
C2008	ECQM1H562KZ	Polyester 50V 0.0056	1		C8011-8014	ECKW1H103ZF5	Ceramic 50V 0.01	4	
C2009	ECEA0JS101	Electrolytic 6.3V 100	1		C8015	ECKW1H221KB5	Ceramic 50V 220P	1	
C2010	ECEA1EN3R3S	Electrolytic 25V 3.3	1		C8016	ECCW1H470JC5	Ceramic 50V 47P	1	
C2011	ECEA1HS2R2	Electrolytic 50V 2.2	1			or ECCW1H470KC5			
C2012-2014	ECEA50ZR22	Electrolytic 50V 0.22	3		C8017	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C2015	ECQM1H822KZ	Polyester 50V 0.0082	1		C8018	ECKW1H102KB5	Ceramic 50V 0.001	1	
C2016	ECQM1H103KZ	Polyester 50V 0.01	1		C8020,8021	ECKW1H103ZF5	Ceramic 50V 0.01	2	
C2017-2019	ECEA1HN010S	Electrolytic 50V	1	3	C8022	ECCW1H270JC5	Ceramic 50V 27P	1	
C2020	ECQM1H333KV	Polyester 50V 0.033	1			or ECCW1H270KC5			
	or ECQM1H333KZ				C8023,8024	ECKW1H103ZF5	Ceramic 50V 0.01	2	
C2021	ECSF16E3R3	Tantalum 16V 3.3	1		C8025	ECEA1ES3R3	Electrolytic 25V 3.3	1	
C2022	ECKW1H472KB5	Ceramic 50V 0.0047	1		C8026	ECCW1H820JC5	Ceramic 50V 82P	1	
C2023	ECEA1HS010	Electrolytic 50V	1	1		or ECCW1H820KC5			
C2024	ECEA0JS470	Electrolytic 50V 47	1		C8027	ECKW1H471KB5	Ceramic 50V 470P	1	
C2025	ECQM1H563KV	Polyester 50V 0.056	1		C8028	ECQM1H103KZ	Polyester 50V 0.01	1	
	or ECQM1H563KZ				C8029	ECEA1CS100	Electrolytic 16V 10	1	
C2026	ECQM1H562KZ	Polyester 50V 0.0056	1		C8030	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C2027	ECKW1H103ZF5	Ceramic 50V 0.01	1		C8031,8032	ECCW1H080CC5	Ceramic 50V 8P	2	
C2028	ECEA0JS470	Electrolytic 6.3V 47	1			or ECCW1H080DC5			
C2029	ECEA50Z1	Electrolytic 50V	1	1	C8033	ECEA1CS470	Electrolytic 16V 47	1	
C2030-2032	ECEA1HN010S	Electrolytic 50V	1	3	C8034	ECKW1H103ZF5	Ceramic 50V 0.01	1	
C2033	ECEA1CS101	Electrolytic 16V 100	1		C8035	MCV03R200ER	Trimmer 20P	1	
C2034	ECQV05334JZ	Polyester 50V 0.33	1						

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
Q6030	2SD636(Q,R)		1				1/4W 82K	1	
Q6031	2SB641(Q,R)		1		R6027	ERD10TJ273	27K	1	
Q6032-6035	2SD636(Q,R)		4		R6028	EROS2TKG1003	Precision Metal Film	1	
Q6036,6037	2SB641(Q,R)		2				1/4W 100K		
Q6038-6041	2SD636(Q,R)		4		R6029	ERD10TJ103	10K	1	
Q6042	2SD1206(Q,R)		1		R6030	ERD10TJ473	47K	1	
					R6031	ERD10TJ224	220K	1	
					R6032	ERD10TJ223	22K	1	
					R6033	ERD10TJ103	10K	1	
					R6034,6035	ERD10TJ223	22K	2	
		Diodes			R6036	ERD10TJ563	56K	1	
D6001,6002	MA165 or		2		R6037-6040	ERD10TJ103	10K	4	
	1SS119				R6041	ERD10TJ562	5.6K	1	
D6004-6016	MA165 or		13		R6042	ERD10TJ103	10K	1	
	1SS119				R6043	ERD10TJ223	22K	1	
D6017	RD5.6JB	Zener	1		R6044	ERD10TJ473	47K	1	
D6018-6037	MA165 or		20		R6045,6046	ERD10TJ103	10K	2	
	1SS119				R6047	ERD10TJ124	120K	1	
D6038	RD5.6JB	Zener	1		R6048	ERD10TJ152	1.5K	1	
D6039,6040	EM12 or		2		R6049	ERD10TJ682	6.8K	1	
	ERB12-01				R6050	ERD10TJ102	1K	1	
D6041	RD15JB3	Zener	1		R6051	ERD10TJ562	5.6K	1	
D6042	MA165 or		1		R6052	ERD10TJ564	560K	1	
	1SS119				R6053	ERD10TJ332	3.3K	1	
D6043	EM12 or		1		R6054	ERD10TJ561	560	1	
	ERB12-01				R6055	ERD10TJ272	2.7K	1	
D6044	MA165 or		1		R6056	ERD10TJ473	47K	1	
	1SS119				R6057	ERD10TJ223	22K	1	
D6045	EM12 or		1		R6058	ERD25TJ185	1/4W 1.8M	1	
	ERB12-01				R6059	ERD10TJ223	22K	1	
D6046,6047	MA165 or		2		R6060	ERD10TJ273	27K	1	
	1SS119				R6061	ERD10TJ331	330	1	
D6048,6049	MA150		2		R6062	ERD10TJ152	1.5K	1	
D6050	MA165 or		1		R6063	ERD10TJ224	220K	1	
	1SS119				R6064	ERD10TJ104	100K	1	
D6051	EM12 or		1		R6065	ERD10TJ223	22K	1	
	ERB12-01				R6067,6068	ERD10TJ103	10K	2	
D6052-6088	MA165 or		37		R6069-6072	ERD10TJ223	22K	4	
	1SS119				R6073,6074	ERD10TJ103	10K	2	
D6089	RD15EB3	Zener	1		R6075-6077	ERD10TJ223	22K	3	
D6090-6093	MA165		4		R6078	ERDS2TJ151	1/4W 150	1	
					R6079	ERD10TJ104	100K	1	
					R6080	ERD10TJ223	22K	1	
					R6081	ERD10TJ103	10K	1	
					R6082	ERD10TJ473	47K	1	
		Resistors			R6083	ERD10TJ223	22K	1	
RX6001	EXBP86223K	Complex Comp. 22K	1		R6085	ERD10TJ223	22K	1	
RX6002	EXBP87223K	Complex Comp. 22K	1		R6086	ERD10TJ683	68K	1	
RX6003	EXBP88103K	Complex Comp. 10K	1		R6087	ERD10TJ103	10K	1	
RX6004	EXBP87223K	Complex Comp. 22K	1		R6088	ERD10TJ104	100K	1	
RX6005,6006	EXBP88103K	Complex Comp. 10K	2		R6089,6090	ERD10TJ103	10K	2	
RX6007	EXBP87223K	Complex Comp. 22K	1		R6091	ERD10TJ273	27K	1	
R6001-6006	ERD10TJ223	22K	6		R6092	ERDS2TJ221	1/4W 220	1	
R6007	ERD10TJ104	100K	1		R6093	ERGLANJ560H	Metal Oxide 1W 56	1	
R6008	ERD10TJ332	3.3K	1		R6094-6096	ERD10TJ223	22K	3	
R6009	ERD10TJ473	47K	1		R6097	ERD10TJ563	56K	1	
R6010,6011	ERD10TJ223	22K	2		R6098,6099	ERD10TJ104	100K	2	
R6012	ERD10TJ104	100K	1		R6100	ERD10TJ473	47K	1	
R6013	ERD10TJ223	22K	1		R6101	ERDS2TJ221	220	1	
R6014	ERD10TJ823	82K	1		R6102	ERD10TJ104	100K	1	
R6015	ERD10TJ563	56K	1		R6103,6104	ERD10TJ223	22K	2	
R6016	ERD10TJ222	2.2K	1		R6105	ERD10TJ103	10K	1	
R6017	ERDS2TJ151	1/4W 150	1		R6106-6109	ERD10TJ223	22K	4	
R6018,6019	ERD10TJ223	22K	2		R6110	ERD10TJ333	33K	1	
R6020	ERD10TJ473	47K	1		R6111	ERD10TJ272	2.7K	1	
R6021	ERD10TJ223	22K	1		R6112,6113	ERD10TJ683	68K	2	
R6022	ERD10TJ222	2.2K	1		R6114	ERD10TJ103	10K	1	
R6023,6024	ERD10TJ104	100K	2		R6115	ERD10TJ222	2.2K	1	
R6025	ERD10TJ103	10K	1		R6116,6117	ERD10TJ104	100K	2	
R6026	EROS2TKG8202	Precision Metal Film	1		R6118	ERD10TJ563	56K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R6119	ERD10TJ103		10K 1		R6197	ERD10TJ273		27K 1	
R6120	ERD10TJ332		3.3K 1		R6198	ERD10TJ103		10K 1	
R6121,6122	ERD10TJ823		82K 2		R6199	ERD10TJ224		220K 1	
R6123	ERD10TJ332		3.3K 1		R6200,6201	ERD10TJ104		100K 2	
R6124,6125	ERD10TJ823		8.2K 2		R6202	ERD10TJ103		10K 1	
R6126,6127	ERD10TJ273		27K 2		R6203	ERD10TJ123		12K 1	
R6128	ERD10TJ683		68K 1		R6204	ERD10TJ333		33K 1	
R6129	ERD10TJ103		10K 1		R6205	ERD10TJ562		5.6K 1	
R6130	ERD10TJ223		22K 1		R6206	ERDS2TJ105	1/4W 1M	1	
R6131	ERD10TJ102		1K 1		R6207	ERD10TJ223		22K 1	
R6132	ERD10TJ333		33K 1		R6208	ERD10TJ821		820 1	
R6133	ERDS2TJ151	1/4W	150 1		R6209	ERD10TJ104		100K 1	
R6134	ERD10TJ103		10K 1		R6210	ERD10TJ183		18K 1	
R6135	ERD10TJ562		5.6K 1		R6211	ERD10TJ104		100K 1	
R6136	ERD10TJ103		10K 1		R6212	ERD10TJ103		10K 1	
R6137	ERD10TJ273		27K 1		R6213	ERD10TJ102		1K 1	
R6138	ERD10TJ153		15K 1		R6214	ERD10TJ104		100K 1	
R6139	ERD10TJ103		10K 1		R6215	ERD10TJ683		68K 1	
R6140	ERG2ANJ560	Metal Oxide 2W	56 1		R6216	ERD10TJ223		22K 1	
R6141	ERDS2TJ222	1/4W 2.2K	1		R6217	ERD10TJ393		39K 1	
R6142,6143	ERD10TJ272		2.7K 2		R6218	ERD10TJ103		10K 1	
R6144	ERD10TJ223		22K 1		R6219	ERD10TJ104		100K 1	
R6145	ERD10TJ821		820 1		R6220	ERD10TJ103		10K 1	
R6146	ERD10TJ472		4.7K 1		R6221	ERD10TJ104		100K 1	
R6147	ERD10TJ333		33K 1		R6222	ERD25TJ473	1/4W 47K	1	
R6148	ERD10TJ223		22K 1		R6223	ERD10TJ103		10K 1	
R6149,6150	ERD10TJ472		4.7K 2		R6224	ERDS2TJ561	1/4W 560	1	
R6151	ERD10TJ223		22K 1		R6225	ERD10TJ223		22K 1	
R6152	ERX1ANJ1ROH	Metal Oxide 1W	1 1		R6226	ERD25TJ331	1/4W 330	1	
R6153	ERD10TJ223		22K 1		TH6001	ERTD2ZHL102S	Thermistor	1	
R6154,6155	ERD10TJ822		8.2K 2						
R6156	ERX1ANJR82H	Metal Oxide 1W	0.82 1						
R6157	ERD10TJ473		47K 1						
R6158	ERD10TJ273		27K 1						
R6159	ERD10TJ473		47K 1						
R6160	ERD20TJ472		4.7K 1				Capacitors		
R6161	ERD10TJ222		2.2K 1		CX6002	EXFP8331M	Complex Comp. 50V 330P	1	
R6162	ERD10TJ564		560K 1		C6001,6002	ECQP1392GZ	Polyester 100V0.0039	2	
R6163	ERD10TJ103		10K 1		C6003	ECEA0JS470	Electrolytic 6.3V 47	1	
R6164	ERD10TJ683		68K 1		C6004	ECEA1CK100	Electrolytic 16V 10	1	
R6165	ERD10TJ564		560K 1		C6005,6006	ECCW1H220JC5	Ceramic 50V 22P	2	
R6166	ERD10TJ222		2.2K 1		C6007	ECEA1HK0R1	Electrolytic 50V 0.1	1	
R6167	ERD10TJ474		470K 1		C6008,6009	ECKW1H103ZF5	Ceramic 50V 0.01	2	
R6168	ERD10TJ332		3.3K 1		C6010	ECEA0JK470	Electrolytic 6.3V 47	1	
R6169	ERD10TJ333		33K 1		C6011	ECQM1H472KZ	Polyester 50V 0.0047	1	
R6170	ERD10TJ474		470K 1		C6013	ECEA1EK4R7	Electrolytic 25V 4.7	1	
R6171	ERD10TJ562		5.6K 1		C6014	ECEA1HS2R2	Electrolytic 50V 2.2	1	
R6172	ERD10TJ182		1.8K 1		C6015	ECEA1CS100	Electrolytic 16V 10	1	
R6173	ERDS2TJ181	1/4W 180	1		C6016,6017	ECKW1H103ZF5	Ceramic 50V 0.01	2	
R6174	ERD10TJ563		56K 1		C6018	ECEA1CS470	Electrolytic 16V 47	1	
R6175	ERD10TJ332		3.3K 1		C6019	ECEA1CK470	Electrolytic 16V 47	1	
R6176,6177	ERD10TJ183		18K 2		C6020	ECEA1ES100	Electrolytic 25V 10	1	
R6178	ERD10TJ103		10K 1		C6021	ECEA1ESS470	Electrolytic 25V 47	1	
R6179	ERD10TJ122		1.2K 1		C6022,6023	ECEA1HS010	Electrolytic 50V 1	2	
R6180	EVMHOGA00B13	Variable	1K 1		C6024	ECEA1CS470	Electrolytic 16V 47	1	
R6181	ERD10TJ122		1.2K 1		C6025	ECKW1H103ZF5	Ceramic 50V 0.01	1	
R6182	ERD10TJ154		150K 1		C6026	ECEA1HS010	Electrolytic 50V 1	1	
R6183	ERD10TJ563		56K 2		C6028	ECEA0JS221	Electrolytic 6.3V 220	1	
R6184	ERD10TJ473		47K 1		C6029,6030	ECEA1CS100	Electrolytic 16V 10	2	
R6185	ERD10TJ104		100K 1		C6031	ECEA1HS010	Electrolytic 50V 1	1	
R6186	ERD10TJ563		56K 1		C6032	ECEA1CS220	Electrolytic 16V 22	1	
R6187	ERD10TJ333		33K 1		C6033	ECEA1CS101	Electrolytic 16V 100	1	
R6188	ERD10TJ223		22K 1		C6034	ECEA1CS100	Electrolytic 16V 10	1	
R6189	ERD10TJ473		47K 1		C6035	ECQV05334JZ	Polyester 50V 0.33	1	
R6190,6191	ERD10TJ103		10K 2		C6036	ECEA0JS470	Electrolytic 6.3V 47	1	
R6192	ERD10TJ153		15K 1		C6037	ECEA1CS100	Electrolytic 16V 10	1	
R6193	ERD10TJ273		27K 1		C6038,6039	ECCW1H220JC5	Ceramic 50V 22P	2	
R6194	ERD10TJ223		22K 1		C6040	ECEA1ES470	Electrolytic 25V 47	1	
R6195	ERDS2TJ151	1/4W 150	1		C6041	ECEA1ES4R7	Electrolytic 25V 4.7	1	
R6196	ERD10TJ123		12K 1		C6042	ECEA1CS470	Electrolytic 16V 47	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Timer Operation & Channel Switches C.B.A.					Audio II & Dolby C.B.A.		
		Integrated Circuit					Integrated Circuits		
IC7201	AN6873 or AN6873N		1		IC4401	AN6209		1	
					IC4402,4403	TA7629P		2	
		Transistors					Transistors		
Q7201-7204	2SD636(Q,R)		4		Q4401-4405	2SD636(Q,R)		5	
Q7205	2SB642(Q,R,S)		1		Q4406	2SB788(S,T)		1	
Q7206	2SB644(Q,R,S)		1		Q4407,4408	2SD958(R,S,T)		2	
					Q4409-4411	2SD636(Q,R)		3	
		Diodes					Diodes		
D7201-7220	LN31GCPHLM	LED	20		D4401,4402	MA165		2	
D7221	MA165		1			or 1SS119			
D7222	EQA01-08	Zener	1						
D7223	EQA01-11	Zener	1						
D7224	EQA01-16	Zener	1						
D7225	LN31GCPHLM	LED	1				Resistors		
					R4401	ERD10TJ333	33K	1	
		Resistors			R4402	EVNK6AA00B53	Variable	5K	1
R7201	ERDS2TJ181	1/4W 180	1			or EVN52JA00B53			
R7202-7205	ERD10TJ102	1K	4		R4403	ERD10TJ124	120K	1	
R7206-7221	ERDS2TJ221	1/4W 220	16		R4404	ERD10TJ181	180	1	
R7223,7224	ERDS2TJ561	1/4W 560	2		R4405	ERD10TJ221	220	1	
R7225	ERDS2TJ472	1/4W 4.7K	1		R4406	ERD10TJ331	330	1	
R7226	ERDS2TJ392	1/4W 3.9K	1		R4407-4409	ERD10TJ223	22K	3	
					R4411,4412	ERD10TJ472	4.7K	2	
					R4413	EVNK6AA00B54	Variable	50K	1
						or EVN52JA00B54			
		Capacitors			R4414	ERD10TJ272	2.7K	1	
G7201	ECEA1HK3R3	Electrolytic 50V 3.3	1		R4415	ERD10TJ122	1.2K	1	
C7202	ECKFIH1032P	Ceramic 50V 0.01	1		R4416	ERD10TJ222	2.2K	1	
					R4417	ERD10TJ105	1M	1	
					R4418	ERD10TJ333	33K	1	
					R4419	ERD10TJ472	4.7K	1	
		Pin Headers			R4420	ERD10TJ181	180	1	
P7201	VJPS1141	2P	1		R4421	ERD10TJ561	560	1	
P7202	VJPS1146	10P	1		R4422	ERD10TJ271	270	1	
P7204	VJPS1146	10P	1		R4423	ERD10TJ100	10	1	
P7205	VJPS1142	3P	1		R4424	ERD10TJ223	22K	1	
					R4425	ERD10TJ183	18K	1	
					R4426	ERD10TJ102	1K	1	
					R4427	ERD10TJ100	10	1	
		Switches			R4428,4429	ERD10TJ223	22K	2	
SW7201	EVQPR04K or EVQPY04K	Push SW	1		R4430	ERD10TJ271	270	1	
SW7202-7226	EVQ-QJ104K	Push SW	25		R4431	EVNK6AA00B24	Variable	20K	1
SW7227	VES0198	Slide SW	1			or EVN52JA00B24			
SW7228	VESS0014	Slide SW	1		R4432	ERD10TJ822	8.2K	1	
SW7229	VES0198	Slide SW	1		R4433	ERD10TJ332	3.3K	1	
					R4434	ERD10TJ103	10K	1	
					R4435	ERD10TJ331	330	1	
					R4436	ERD10TJ103	10K	1	
					R4437	ERD10TJ104	100K	1	
					R4438	ERD25TJ332	1/4W 3.3K	1	
		Miscellaneous			R4439	ERD25TJ123	1/4W 12K	1	
DP7201	VSSZ0005	Display Tube	1		R4440	ERD25TJ223	1/4W 22K	1	
	VEKS0938	Look-in Connector	1		R4441	ERD25TJ392	1/4W 3.9K	1	
	VMS00080	LED Spacer	1		R4442	ERD25TJ821	1/4W 820	1	
	VMS0100	Timer Display Tube Holder	1		R4443,4444	ERD10TJ223	22K	2	
	VMS0105	LED Spacer	1		R4446	ERD10TJ223	22K	1	
					R4451	ERD10TJ102	1K	1	
					R4452	ERD10TJ104	100K	1	
					R4453	ERD10TJ274	270K	1	
					R4454	ERD10TJ154	150K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R4455	ERD10TJ332	3.3K	1		C4464	ECQMIH562KZ	Polyester 50V 0.0056	1	
R4456	ERD10TJ473	47K	1		C4465,4466	ECQV05273JZ	Polyester 50V 0.027	2	
R4457	ERD10TJ181	180	1		C4467	ECEA1ES3R3	Electrolytic 25V 3.3	1	
R4458	ERD10TJ103	10K	1		C4468	ECEA1ES4R7	Electrolytic 25V 4.7	1	
R4459,4460	ERD10TJ223	22K	2						
R4461	ERD10TJ104	100K	1						
R4462	ERD10TJ102	1K	1						
R4464	ERD10TJ154	150K	1						
R4465	ERD10TJ332	3.3K	1						
R4466	ERD10TJ473	47K	1				Filters		
R4467	ERD10TJ181	180	1		T4401,4402	VLP0116		2	
R4468	ERD10TJ273	27K	1						
R4469	ERD10TJ392	3.9K	1						
R4471,4472	ERD10TJ473	47K	2				Coils		
R4473	ERD10TJ223	22K	1		L4401,4402	VLQ00W222K	2.2mH	2	
R4474	ERD10TJ274	270K	1						
							Pin Header		
		Capacitors			P4401	VJPS1144	6P	1	
C4401	ECCW1H471J5	Ceramic 50V 470P	1		P4402	VJPS1142	3P	1	
C4402	ECEA1ES4R7	Electrolytic 25V 4.7	1		P4403	VJPS1144	6P	1	
C4403	ECKW1H102KB5	Ceramic 50V 0.001	1		P4404	VJPS1141	2P	1	
C4404	ECEA1CS470	Electrolytic 16V 47	1		P4405	VJPS1152	8P	1	
C4405,4406	ECEA50ZR22	Electrolytic 50V 0.22	2		P4406	VJPS1145	8P	1	
C4407	ECQV05333JZ	Polyester 50V 0.033	1		P4408	VJPS1141	2P	1	
C4408	ECEA1CS100	Electrolytic 16V 10	1		P4409	VJPS1148	2P	1	
C4409	ECEA50ZR33	Electrolytic 50V 0.33	1						
C4410	ECEA1CS100	Electrolytic 16V 10	1						
C4411	ECEA50ZR22	Electrolytic 50V 0.22	1						
C4412	ECEA1CS100	Electrolytic 16V 10	1						
C4413	ECEA1CS101	Electrolytic 16V 100	1						
C4418	ECEA1CS220	Electrolytic 16V 22	1						
C4419	ECEA1HS010	Electrolytic 50V 1	1				Power Supply C.B.A.		
C4420,4421	ECEA1CS100	Electrolytic 16V 10	2						
C4422	ECEA50ZR15	Electrolytic 50V 0.15	1						
C4423	ECQV05473JZ	Polyester 50V 0.047	1				Integrated Circuit		
C4424	ECQV05823JZ	Polyester 50V 0.082	1		IC1001	AN7806		1	
C4425	ECEA1CS100	Electrolytic 16V 10	1			or HA17806P			
C4426	ECEA1CS330	Electrolytic 16V 33	1						
C4427	ECKW1H102KB5	Ceramic 50V 0.001	1						
C4428	ECKW1H561KB5	Ceramic 50V 560P	1						
C4429	ECKW1H102KB5	Ceramic 50V 0.001	1				Transistors		
C4430	ECEA1ES3R3	Electrolytic 25V 3.3	1		Q1001	2SC1318(Q,R)		1	
C4431	ECEA1CS330	Electrolytic 16V 33	1			or 2SD639(Q,R)			
C4432	ECKW1H561KB5	Ceramic 50V 560P	1		Q1002	2SD636(Q,R)		1	
C4435	ECEA1CS100	Electrolytic 16V 10	1		Q1004	2SB643(Q,R)		1	
C4436,4437	ECEA1CS101	Electrolytic 16V 100	2		Q1005	2SD636(Q,R)		1	
C4439	ECQMIH822KZ	Polyester 50V 0.0082	1						
C4440,4441	ECEA1CS100	Electrolytic 16V 10	2						
C4442	ECQV05334JZ	Polyester 50V 0.33	1						
C4443	ECQV05104JB	Polyester 50V 0.1	1				Diodes		
C4444	ECEA1CS100	Electrolytic 16V 10	1		D1001,1002	RB402		2	⚠
C4445	ECQV05473JZ	Polyester 50V 0.047	1		D1004	MT-152RA		1	⚠
C4446	ECQMIH103KZ	Polyester 50V 0.01	1		D1005	MT-152A		1	⚠
C4447	ECQMIH472KZ	Polyester 50V 0.0047	1		D1006,1007	EM12		2	⚠
C4448	ECEA1CS100	Electrolytic 16V 10	1			or ERB12-01			
C4449	ECQMIH562KZ	Polyester 50V 0.0056	1		D1008-1010	MA165		3	
C4450,4451	ECEA1CS101	Electrolytic 16V 100	2			or 1SS119			
C4453	ECQMIH822KZ	Polyester 50V 0.0082	1		D1011	EQA02-06C	Zener	1	
C4454-4456	ECEA1CS100	Electrolytic 16V 10	3			or RD6.2EB1			
C4457	ECQV05334JZ	Polyester 50V 0.33	1		D1016	MT-152A		1	⚠
C4458	ECQV05104JB	Polyester 50V 0.1	1						
C4459	ECEA1CS100	Electrolytic 16V 10	1						
C4460	ECQV05473JZ	Polyester 50V 0.047	1						
C4461	ECQMIH103KZ	Polyester 50V 0.01	1						
C4462	ECQMIH472KZ	Polyester 50V 0.0047	1				Resistors		
C4463	ECEA1CS100	Electrolytic 16V 10	1		R1001	ERC12ZGK275	Solid 1/2W 2.7K	1	⚠
					R1002	ERD25TJ392	1/4W 3.9K	1	

[illegible]

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Tape Slack Sensor C.B.A.					TV Demodulator C.B.A.		
		Transistor					Integrated Circuits		
Q1554	PN205		1		IC701	AN5215		1	
					IC702	BN5115		1	
		Diode							
D1553	LN55	LED	1				Transistors		
					Q702	2SA564A(Q,R,S)		1	
						or 2SB642(Q,R,S)			
					Q703,704	2SC1685(Q,R,S)		2	
		Resistor				or 2SD637(Q,R,S)			
R1553	ERDS1TJ561	1/2W 560	1		Q707-709	2SC1685(Q,R,S)		3	
	or ERD50TJ561					or 2SD637(Q,R,S)			
					Q714	2SA684(Q,R,S)		1	
					Q715,716	2SA564A(Q,R,S)		2	
						or 2SB642(Q,R,S)			
		Miscellaneous			Q717	2SC1685(Q,R,S)		1	
	VJBS00190	Tape Slack Sensor P.C.B.	1			or 2SD637(Q,R,S)			
	VMD50061	Tape Slack Sensor Bracket	1		Q718,719	2SA564A(Q,R,S)		2	
						or 2SB642(Q,R,S)			
					Q720	2SC1685(Q,R,S)		1	
						or 2SD637(Q,R,S)			
					Q721	2SC1685(C,R)		1	
						or 2SD637(C,R)			
					Q722-724	2SC1685(Q,R,S)		3	
						or 2SD637(Q,R,S)			
							Diodes		
					D701-703	MA165		3	
						or 1SS119			
		Supply Photo Tr C.B.A.			D705	MA165		1	
						or 1SS119			
		Transistor			D708	MA165		1	
						or 1SS119			
Q1552	PN150NV		1		D710	RD5.6JB2	Zener	1	
					D711	μPC574J	Zener	1	
					D712	MA165		1	
						or 1SS119			
		Diode			D713	MA161C		1	
D1559	MA161C		1						
							Resistors		
		Miscellaneous			R701	ERD10TJ182	1.8K	1	
	VJBS00201	Supply Photo Tr P.C.B.	1		R702	ERD10TJ333	33K	1	
					R703	ERD25FJ220	1/4W 22	1	
					R704	EVNK6AA00B14	Variable 10K	1	
					R705,706	ERD10TJ103	10K	2	
					R707	ERD25TJ225	1/4W 2.2M	1	
					R708	ERD10TJ472	4.7K	1	
					R709	ERD10TJ470	47	1	
					R710	EVNK6AA00B14	Variable 10K	1	
					R711	ERD10TJ102	1K	1	
					R712	ERD10TJ821	820	1	
					R713	ERD10TJ272	2.7K	1	
					R714	ERD10TJ680	68	1	
					R715	ERDS2TJ680	1/4W 68	1	
					R716	ERD10TJ330	33	1	
					R717	ERDS2TJ101	1/4W 100	1	
					R718	ERD10TJ562	5.6K	1	
					R719	ERD10TJ183	18K	1	
					R720	ERD10TJ561	560	1	
					R721	ERD10TJ272	2.7K	1	
					R722	ERD10TJ154	150K	1	
					R723,724	ERD10TJ102	1K	2	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R725	ERD10TJ391		390	1	C728	ECEA1ES3R3	Electrolytic 25V 3.3	1	
R726	ERD10TJ333		33K	1	C729	ECQV05104JB	Polyester 50V 0.1	1	
R727	ERD10TJ274		270K	1		or ECQV05104JZ			
R728	ERD10TJ563		56K	1	C730-733	ECKW1H103ZF5	Ceramic 50V 0.01	4	
R729	ERD10TJ392		3.9K	1	C744	ECKW1H103ZF5	Ceramic 50V 0.01	1	
R730	ERD10TJ102		1K	1	C745	ECEA1CS470	Electrolytic 16V 47	1	
R731	ERD10TJ183		18K	1	C752	ECCW1H560JC5	Ceramic 50V 56P	1	
R732	ERD10TJ682		6.8K	1	C753	ECKW1H103ZF5	Ceramic 50V 0.01	1	
R733	EVNK6AA00B23	Variable	2K	1	C754	ECEA1HS010	Electrolytic 50V 1	1	
R734	ERD10TJ332		3.3K	1	C755	ECEA1AS101	Electrolytic 10V 100	1	
R735	ERD10TJ124		120K	1	C756	ECQM1H103KZ	Polyester 50V 0.01	1	
R736	ERD10TJ221		220	1	C758	ECEA1HS010	Electrolytic 50V 1	1	
R737	ERD10TJ124		120K	1	C761	ECKW1H103ZF5	Ceramic 50V 0.01	1	
R748	ERD10TJ103		10K	1	C762	ECEA1CN100S	Electrolytic 16V 10	1	
R749,750	ERD10TJ223		22K	2	C763	ECQM1H473KZ	Polyester 50V 0.047	1	
R752,753	ERD10TJ223		22K	2	C764	ECQM1H223KZ	Polyester 50V 0.022	1	
R758	ERD10TJ472		4.7K	1	C765	ECKW1H103ZF5	Ceramic 50V 0.01	1	
R759	ERD10TJ222		2.2K	1	C768	ECCW1H010CC5	Ceramic 50V 1P	1	
R760	ERD10TJ103		10K	1					
R761	ERD10TJ682		6.8K	1					
R762	ERD10TJ152		1.5K	1					
R764	ERD10TJ222		2.2K	1					
R770	ERDS1TJ682	1/2W	6.8K	1					
R771	ERD25FJ561	1/4W	560	1			Filters		
R773	ERD10TJ222		2.2K	1	FL701	EFCS4R5MS4		1	
R774	ERD10TJ223		22K	1		or SFE4R5MB4			
R775	ERD10TJ823		82K	1	FL702	EFCS4R5MW3		1	
R776,777	ERD10TJ223		22K	2		or TPCS4R5MW3			
R779,780	ERD10TJ222		2.2K	2	FL703	EFCA4R5MC3A		1	
R781	ERD10TJ104		100K	1					
R782	ERD10TJ393		39K	1					
R783	ERD10TJ823		82K	1					
R784	ERD10TJ105		1M	1			Coils		
R785	ERD10TJ474		470K	1	L702	VLQ566F680K		68μH	1
R786	ERD10TJ154		150K	1	L703	VLQ566F181K		180μH	1
R787	ERD10TJ223		22K	1	L704	VLQ566F120K		12μH	1
R788	ERD10TJ683		68K	1	L705	VLQ566F150K		15μH	1
R789	ERD10TJ103		10K	1	L706	VLQ566F2R2K		2.2μH	1
R790	ERD10TJ472		4.7K	1	L707	VLQSR56KB		0.56	1
R791	ERD10TJ273		27K	1	L708	VLQ80W680K		68μH	1
					L710	VLQ80W620K		62μH	1
					L711	VLQ80W101K		100μH	1
					L712	VLQ566F330K		33μH	1
					L713,714	VLQ566F4R7K		4.7μH	2
		Capacitors							
C703	ECCW1H820JR5	Ceramic 50V 82P	1				Pin Headers		
C704	ECQM1H473KV	Polyester 50V 0.047	1		P702	VJPS1143		5P	1
	or ECQM1H473KZ				P703	VJPS1141		2P	1
C705	ECEA1CS471	Electrolytic 16V 470	1		P704	VJPS1143		5P	1
C708	ECEA1CS100	Electrolytic 16V 10	1		P705	VJPS1145		8P	1
C709	ECEA1HS010	Electrolytic 50V 1	1		P706	VJPS1142		3P	1
C710	ECCW1H220JC5	Ceramic 50V 22P	1		P707	VJPS1143		5P	1
C711	ECCW1H820JC5	Ceramic 50V 82P	1		P708	VJPS1141		2P	1
C712	ECEA1AS102	Electrolytic 10V 1000	1		P710	VJPS1141		2P	1
C713,714	ECEA1EN4R7S	Electrolytic 25V 4.7	2		P711	VJPS1145		8P	1
C715	ECCW1H050CC5	Ceramic 50V 5P	1		P713	VJPS1141		2P	1
C716	ECKW1H391KB5	Ceramic 50V 390P	1		P715,716	VJPS1143		5P	2
	or VCKW1H391JSA								
C717	ECCW1H101KP5	Ceramic 50V 100P	1				Transformers		
C718	ECCW1H180JC5	Ceramic 50V 18P	1		T701	TL562313	I.F.T.		1
C719	ECCW1H270JC5	Ceramic 50V 27P	1		T703	TL167321	I.F.T.		1
	or ECCW1H270KC5				T704	TL181312	I.F.T.		1
C720	ECCW1H220JC5	Ceramic 50V 22P	1		T705	EIM3A423	I.F.T.		1
C721	ECCW1H020CC5	Ceramic 50V 2P	1		T706	EUL-HLB202	I.F.T.		1
C722	ECSZ25EF1N	Tantalum 25V 1	1						
C723	ECKW1H103ZF5	Ceramic 50V 0.01	1						
C724	ECCW1H820JR5	Ceramic 50V 82P	1						
C725	ECCW1H020CC5	Ceramic 50V 2P	1						
C726	ECKW1H103ZF5	Ceramic 50V 0.01	1						
C727	ECEA1CS100	Electrolytic 16V 10	1						

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
	or 2SD636(Q,R,S)				R7546	ERD10TJ224	220K	1	
Q7517	28C1684(R,S,T)		1		R7547	ERD10TJ472	4.7K	1	
	or 2SD636(R,S,T)				R7548,7549	ERD10TJ273	27K	2	
Q7518	28C1684(Q,R,S,T)		1		R7550	ERD10TJ473	47K	1	
	or 2SD636(Q,R,S,T)				R7551	ERD10TJ223	22K	1	
Q7519	28C1684(R,S,T)		1		R7552	ERD10TJ182	1.8K	1	
	or 2SD636(R,S,T)				R7553	ERD10TJ104	100K	1	
Q7520	28A564(R,S,T)		1		R7556	ERD10TJ392	3.9K	1	
	or 2SB641(R,S,T)				R7557	ERD10TJ393	39K	1	
					R7558	ERD10TJ103	10K	1	
					R7559	ERD10TJ104	100K	1	
					R7560	ERD10TJ563	56K	1	
		Diodes			R7561	ERD10TJ101	100	1	
D7501-7516	MA161C		16		R7562	EVN38CA00B53	Variable	5K	1
D7517-7524	MA165		8		R7563	ERD10TJ332	3.3K	1	
	or 1SS119				R7564	ERD10TJ103	10K	1	
D7525	MA26WO-B		1		R7565	ERD10TJ562	5.6K	1	
	or MA27W				R7566-7568	ERD10TJ103	10K	3	
D7526	MA161C		1		R7569	ERD10TJ562	5.6K	1	
D7527	MA150		1		R7570	ERD10TJ102	1K	1	
D7528	MA165		1						
	or 1SS119								
D7529,7530	EM1Z		2						
	or ERB12-02						Capacitors		
D7531	MA165		1		C7501	ECKW1H103ZF5	Ceramic 50V 0.01	1	
	or 1SS119				C7502	ECEA1HS010	Electrolytic 50V	1	1
D7534	EQA01-07	Zener	1		C7503	ECQV05104JB	Polyester 50V 0.1	1	
	or RD6.8EB					or ECQV05104JZ			
D7535	MA522		1		C7504	ECKW1H102KB5	Ceramic 50V 0.001	1	
D7536	MA165		1		C7505	ECCW1H150JC5	Ceramic 50V 15P	1	
	or 1SS119				C7506	ECCW1H050CC5	Ceramic 50V 5P	1	
					C7507	ECV1ZW20X32	Trimmer 20P	1	
					C7508	ECEA1HS010	Electrolytic 50V	1	1
					C7509	ECEA1CS100	Electrolytic 16V 10	1	1
					C7510	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		Resistors			C7511	ECEA1AS221	Electrolytic 10V 220	1	
RX7501-7503	EXBP88103K	Complex Comp.	10K 3		C7512	ECEA1CS220	Electrolytic 16V 22	1	
R7501-7507	ERD10TJ273		27K 7		C7513	ECEA1AS101	Electrolytic 10V 100	1	
R7508,7509	ERD10TJ123		12K 2		C7514	ECKW1H103ZF5	Ceramic 50V 0.01	1	
R7510	ERD10TJ104		100K 1		C7515	ECEA1HS3R3	Electrolytic 50V 3.3	1	
R7511,7512	ERD10TJ102		1K 2						
R7513	ERDS1TJ561	1/2W	560 1				Crystal Oscillator		
R7514	ERD10TJ123		12K 1		X7501	VXS0071		1	
R7515,7516	ERD10TJ102		1K 2						
R7517	ERD10TJ123		12K 1						
R7518,7519	ERD10TJ102		1K 2						
R7520,7521	ERD10TJ123		12K 2						
R7522	ERD10TJ102		1K 1				Pin Headers		
R7523	ERD10TJ222		2.2K 1		P7501	VJPS1143	5P	1	
R7524	ERD10TJ681		680 1		P7502	VJPS1145	8P	1	
R7525	ERD10TJ47		4.7 1		P7503	VJPS1142	3P	1	
R7526	ERD10TJ222		2.2K 1		P7504-7506	VJPS1145	8P	3	
R7527	ERD10TJ221		220 1		P7507	VJPS1146	10P	1	
R7528	ERD10TJ332		3.3K 1		P7509	VJPS1147	12P	1	
R7529	ERD10TJ104		100K 1		P7511	VJPS1146	10P	1	
R7530	ERD10TJ333		33K 1						
R7531	ERD10TJ154		150K 1						
R7532	ERD10TJ123		12K 1						
R7533	ERD10TJ273		27K 1						
R7534	ERD10TJ103		10K 1						
R7535	ERD10TJ472		4.7K 1						
R7536	ERD10TJ223		22K 1						
R7537,7538	ERD10TJ562		5.6K 2						
R7539,7540	ERD10TJ103		10K 2						
R7541	ERD10TJ223		22K 1						
R7542	ERD10TJ102		1K 1						
R7543	ERD10TJ472		4.7K 1						
R7544	ERD25TJ103	1/4W	10K 1						
R7545	ERD10TJ104		100K 1						

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		One Touch REC C.B.A.			C7608	ECEAICS100	Electrolytic 16V 10	1	
					C7610,7611	ECCWIH101JC5	Ceramic 50V 100P	2	
		Integrated Circuits							
IC7601	μPD4002BC		1				Pin Headers		
IC7602	MN4011B		1		P7601	VJPS1143		5P	1
IC7603	μPD4012BC		1		P7602	VJPS1147		12P	1
IC7604	μPD4069UBC		1		P7603	VJPS1141		2P	1
IC7605	MN4071B		1						
IC7606	TC4015BP		1						
IC7607	TC4024BP		1						
IC7608	μPD4040BC		1						
IC7609	MN4011B		1						
IC7610	MN4001B		1						
		Transistors							
Q7601,7602	2SC1684(Q,R,S)		2						
	or 2SD636(Q,R,S)								
		Diodes							
D7601,7602	MA165		2						
D7603	RD5.1JB1	Zener	1						
D7606,7607	MA165		2						
D7612	MA165		1						
D7613	MA150		1						
		Resistors							
R7601	ERDS2TJ102	1/4W 1K	1						
R7602	ERDS2TJ104	1/4W 100K	1						
R7603	ERDS2TJ103	1/4W 10K	1				Output Jack C.B.A.		
R7604	ERDS2TJ104	1/4W 100K	1						
R7605	ERDS2TJ103	1/4W 10K	1						
R7606	ERDS2TJ183	1/4W 18K	1				Diodes		
R7607	ERDS2TJ681	1/4W 680	1		D1564,1565	ERZ-C03DK220	Zener	2	
R7608	ERDS2TJ103	1/4W 10K	1						
R7609	ERDS2TJ102	1/4W 1K	1						
R7610	ERDS2TJ103	1/4W 10K	1						
R7611	ERDS2TJ102	1/4W 1K	1				Capacitors		
R7612	ERDS2TJ154	1/4W 150K	1		C1554,1555	ECKWIH103ZF5	Ceramic 50V 0.01	2	
R7613	ERDS2TJ123	1/4W 12K	1						
R7614,7615	ERDS2TJ103	1/4W 10K	2						
R7616	ERDS2TJ104	1/4W 100K	1						
R7617,7618	ERDS2TJ103	1/4W 10K	2				Coils		
R7619	ERDS2TJ102	1/4W 1K	1		L1551-1553	VLQS66F220K		22μH	3
R7620	ERDS2TJ151	1/4W 150	1						
R7621-7625	ERDS2TJ183	1/4W 18K	5						
R7626,7627	ERDS2TJ103	1/4W 10K	2						
R7628-7636	ERDS2TJ151	1/4W 150	9				Pin Headers		
R7637,7638	ERDS2TJ103	1/4W 10K	2		P1555	VJP1148		2P	1
R7639	ERDS2TJ223	1/4W 22K	1		P1556,1557	VJPS1149		3P	2
R7640	ERDS2TJ104	1/4W 100K	1						
R7641	ERDS2TJ223	1/4W 22K	1						
		Capacitors					Miscellaneous		
C7601	ECEA50ZR1	Electrolytic 50V 0.1	1			VEKS0726	Lug Ass'y	1	
C7602	ECKWIH103ZF5	Ceramic 50V 0.01	1			VJBS00185	Output Jack P.C.B.	1	
C7603	ECEA102100	Electrolytic 10V 100	1						
C7604	ECKFIH102ZF	Ceramic 50V 0.001	1						
	or ECKWIH102ZF5								
C7605	ECQV05104JB	Polyester 50V 0.1	1						
C7606	ECKWIH103ZF5	Ceramic 50V 0.01	1						

